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A CWC/I PUBLICATION

80 micro

the magazine for TRS-80 users*

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- GW-Basic Compiler
- 3 Portable Printers
- Monte's Window

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PATCH WORK REVISITED
13 More Ways To Upgrade TRSDOS 1.3

MODEL 4 MAGIC
Run 2 Programs Simultaneously With LDOS 5.1

SOFTWARE RIOT!
Our Techies Pick Their Dream Libraries

NEW FEATURE:
Dave's MS-DOS Column

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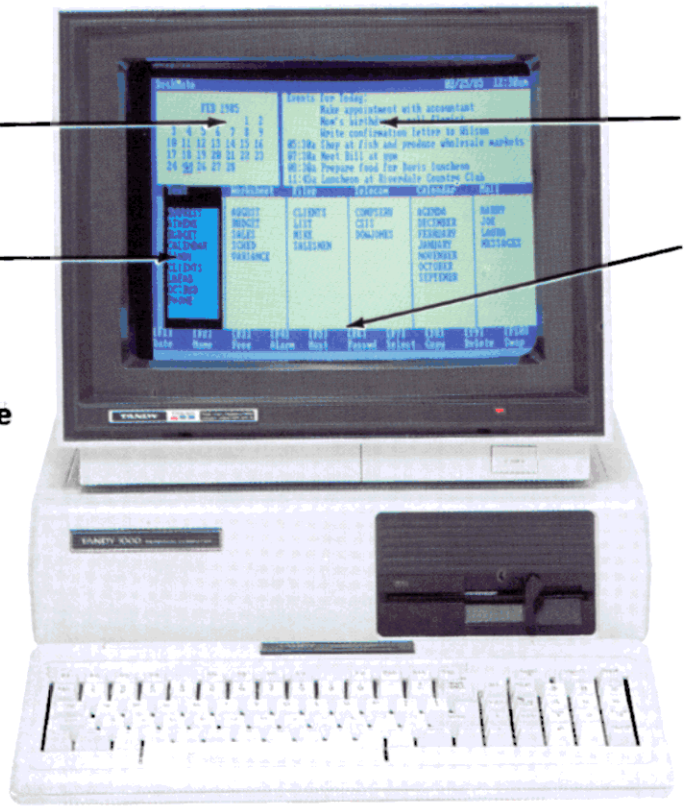

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A Tandy 1000 costs less than IBM's PC, and comes complete with adapters to use a color or monochrome monitor, printer, joysticks and light pen. These adapters, as well as a disk operating system (DOS) and BASIC, are "extras" on the IBM PC!

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Come in today and get the most computer you can buy for your money.

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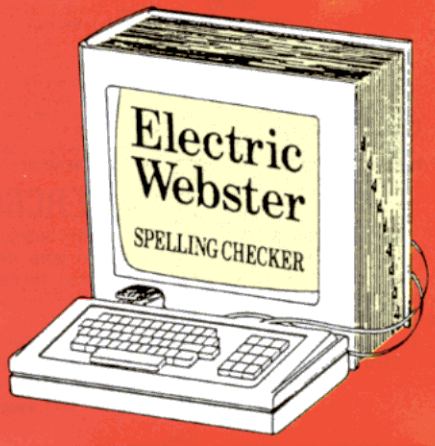
"The Cadillac" of spelling checkers
— 80 Microcomputing, 9/82



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"Electric Webster is the best. Just read any review in any magazine and I don't believe that you will find even one disagreement to that statement." *CINTUG, Cincinnati's Users Group Mag. 4/83*

"The most helpful program I've found is Electric Webster. After looking at nine proofreading programs, I've settled on Webster . . ." *Creative Computing 11/83*

This dictionary is not published by the original publishers of *Webster's Dictionary* or their successors.

Performance "Excellent"; Documentation "Good"; Ease of Use "Excellent"; Error Handling "Excellent". *Info World, 8/82*

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One of the best and newest games from Infocom. A hilarious Science Fiction Adventure game developed from Douglas Adam's best selling novel. Your mission... finding that out is half the fun, as you travel the lengths of the Galaxy, encountering strange and often deadly creatures. This game is a definite must for any avid adventurer, or any eager beginner.

MODEL 3/4 ONLY **$34.50**

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The cornerstone of JMG, this game combines strategy with common sense. The goal is to defeat opposing countries while at the same time properly caring for your own country. Battle computer countries, other humans, or combinations of both (up to nine countries total). An entertaining and educational simulation of government policies and their consequences.

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A role-playing fantasy game based loosely on the hit Dungeons and Dragons. Your long-term objective is develop characters strong enough to survive exploration of the Castle. The full game takes six months to play and provides many rooms and levels. A sure hit with any D & D fanatics.

MODELS 1/3 ..... **$39.50**

THE FRENCH CONNECTION

By far the most powerful Bulletin Board System for Models I, III, and 4(III). TFC is written in 100% Z-80 Assembly language for both efficiency and security. Features Upload/Download, open access or private password, layered menus, individual user modifications, and much, much more. (See also separate ad in this publication!).

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"The best high-resolution bit-image graphics program on the market for the TRS-80." Your screen becomes a window on your larger full-page drawing board. AUTODRAW feature for lines and circles. The creation of large graphics is easy. Design and save your own graphic characters as well. Does not need a high-res board to produce high-res graphics. POWERDOT II is 100% Machine Language and supports Epson, ProWriter. Okidata and Radio Shack printers. (Please specify printer when ordering.)

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Model 4/4P Only (List $50.00) **$46.50**

SUPERCROSS XT

A program designed specifically for transferring data and program files freely between your own TRS-80 disks and those of many other computers. Eliminates the need for modems, terminal programs or access to a second computer. You can copy programs from 70 different DOS formats directly. Also FORMATS, displays DIRECTORY or KILLS files on alien disks, and can even copy "FOREIGN-TO-FOREIGN" in one step. Copies ASCII, Bit-Image, and Random Files back and forth.

MODELS 1/III/4 ..... **$ 94.50**
with Convert Basic Option **$112.50**

LE SCRIPT

Our best selling word processor, loaded with many features not found anywhere else. Characteristics of Le Script include great printer support, ease of use, full Model 4 support, and much much more! On a 128K Model 4 you can have over 90K of text buffer for use on a single file (not split) into multiple buffers as is the case in other WP programs). Model 4 features also available while running in the Model 3 mode! The same program will run under most DOSes, from TRSDOS 2.3 on a Model 1 to DOSPLUS IV on a Model 4. At our low price, this is the best word processing value anywhere.

LE SCRIPT Model 1,3,4 (list $129.95) **$94.50**

ELECTRIC WEBSTER

The best word processor for the TRS-80 Computers. Includes a 50,000 word dictionary, and integrates with most word processors. Features fast checking, interactive correcting, and the ability to add your own words to its dictionary. Not much more you can say about this program, just that it does the job and it does it very well. (Get it quick, before the price goes up to $129.50) Specify computer & word processor when ordering.

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SAVE $80 OFF THE LIST PRICE!!!
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These disks contain a collection of quality public domain programs from all over. There's a wide selection here, from games to utilities to applications, and much more! Each disk is a 40 track "floppy" disk, and both sides are filled to the brim.

PUBLIC DOMAIN DISK PACKAGE, #1 to #4 ..... **$34.50**
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The easiest version of PASCAL to learn! You get extensions to PASCAL that give you screen control, random access files, calls to machine language, the ability to create turn-key packages, etc. PASCAL-80 is a nearly complete subset of standard PASCAL, including structured types, records, pointers, variables and files. Editor and Compiler are in the memory.

PASCAL-80, Models 1,3 or 4 (list $79) ..... **SALE PRICE $59.50**

GREAT PROGRAMS, GREAT PRICES AND FREE SHIPPING!!!

This month we have some new items in our line-up, such as the impressive PRONTO windowing systems from Misosys, which includes some very useful built-in applications that can be called up at any time. Also, we have the new BAS GW Convert program for converting IBM programs to Model 4, special formats of the Disk Drive Analyzer program, and new low prices on PowerDot and PowerMail. Plus, of course, our usual collection of top-quality software for the TRS-80 Models I, III and 4.

APPLICATIONS/BUSINESS

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J & M's Disk Drive Analyzer - I	(89.00)	$ 84.50
J & M's Disk Drive Analyzer - III	(79.00)	$ 74.50
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TAS's ZMAIL Mail List	(29.95)	$ 24.50
LESCRIPT	(129.95)	$ 94.50
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Versa Series (each)	(99.95)	$ 89.50
DOSPLUS 3.5 Mod I/III	(69.95)	$ 59.50
DOSPLUS IVA for Model 4	(169.95)	$119.50

UTILITIES

Alcor C Compiler	(list 250.00)	$ 84.50
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Edas / PRO-CREATE		$ 69.50
ALE - Assembly Language Editor		$ 39.50
M-ZAL Macro Assembler		$ 79.50
Mumford's Instant Assembler		$ 44.50
Instant Assembler Model 4		$ 59.50
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DSMBLR III / PRO-DUCE		$ 23.50
DIS' n' DATA I/III		$ 37.50
DIS' n' DATA Model 4		$ 46.50
TASMON Monitor I/III or 4		$ 34.50
Howe's Monitor #5		$ 19.50
LC / PRO-LC Compiler		$114.50
PASCAL 80 Compiler		$ 59.50
PASCAL 80 for CP/M		$ 36.50
SBE Compiler		$ 94.50
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ZBASIC Compiler		$ 79.50
CNVBASIC Model I/III/4		$ 27.50
Model 4 TOOLBELT		$ 39.50
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6.2 Plus Enhancements		$ 36.50
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MULTIDOS Version 1.7		$ 79.50
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BASIC Disk I/O F & B	$23.50
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MONTHLY SPOTLIGHT

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Versatile "Electronic Notebook" that allows you to access stored information at the touch of a key, keeps notes, memoes, lists, or other information in instantly accessable "pages". SUPERLOG4 for the Model 4 also contains many advanced features and commands that will make you wonder how you ever lived without it.

LOG for Model I or III	$44.50
SUPERLOG for Mod I or III LDOS	$99.50
SUPERLOG4 for Model 4 (List $119.95)	$99.50

CONVERSION CORNER

BASIC 3 TO 4 CONVERT

Operates under Model 4 TRSDOS 6.x, CP/M, MSDOS (general), and MSDOS (2000). Converts Model III programs to run under these systems, inserts spaces and translates commands where necessary. Please specify which version you want.

Basic 3 To 4 Convert (list $49.95) $39.50

BASIC 4 TO 3 CONVERT

Operates on Model I & III DOSes. Converts programs from Mode 4 Basic. Similar to Basic 3 To 4.

Basic 4 To 3 Convert (list $49.95) $39.50

BASIC GW CONVERT

A collection of programs and subroutines designed to translate IBM BASIC programs for use on TRS-80 Model 4! Will even convert high-res graphics if you have a high-res graphics board.

MODEL 4/4P ONLY (list $99.95) $89.50

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We will beat any legitimate price advertised for any product that we carry. If you find a lower price advertised, our price will be $1.00 less, under the same conditions (eg. same shipping and other charges, etc). To receive the lower price you must mention the location of the other ad when ordering.

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We accept orders by phone or mail. When ordering please specify the Model of TRS-80 that you own, the exact program(s) wanted, and the method of payment. We accept Check, Money Order, VISA, MasterCard. (For Electric Webster please mention your word processor.) All prices are listed in U.S. Funds.

OUR GUARANTEE:

We sell only top-quality software. If, however, you are unsatisfied with a product you have purchased from JMG, you may return it (in good condition) within 10 days for a refund, less a $2.50 handling charge for programs under $50 ($5.00 for programs over $50). We also ask that you send us a letter stating the reason for your return.

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Regular shipping in continental US and Canada is FREE (our choice of method). COD orders add $2.50 to cover COD costs. PO's accepted for gov't & schools, add $5.00 handling charge. Overseas orders will be charged actual shipping costs; specify surface or air. All prices subject to change without notice.

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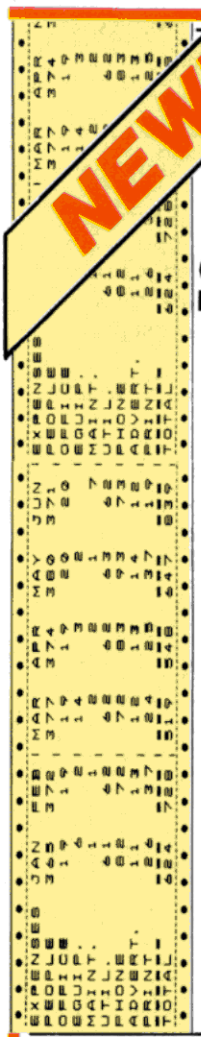

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IS YOUR PRINTER TOO SHORT FOR YOUR SPREADSHEET?

LONGVIEW turns a VisiCalc (R) spreadsheet on its side so that DOTWRITER can print it **down** the paper instead of across. It gives you the effect of a 400-character wide printer (or even longer, if your spreadsheet is that big).

The number of "rows" becomes the limit when you print this way: you can fit between 48 (Microline 92) and 180 (C.ITOH 1550) rows across the page.

LONGVIEW is an "add-on" to our Dotwriter system. It includes programs and three character sizes, and runs on 48K-64K TRS-80 Models I, III, and 4/4P (native Model 4 mode). Please see our ad later in this magazine for information and pricing on Dotwriter, and the printers we support.

LONGVIEW is easy to use and comes with ready-to-run setups. First, tell VisiCalc to print your spreadsheet to disk. Next, rotate the file with LONGVIEW. Then, print it with Dotwriter. That's all there is to it.

LONGVIEW $29.95

(does not include Dotwriter or VisiCalc)

DOWNLOADABLE FONTS $59.95

We have dozens of high-resolution, downloadable fonts for the Radio Shack DMP 2100P and the Epson LQ-1500. They include italics, cursive, headline, and other fancy typefaces. Each font disk includes programs to perform the download, and sample files to print them for you.

The print quality of these fonts must be seen to be believed. ALLWRITE can load these fonts "on the fly" and give you right-justified, proportional printing. If you do not have ALLWRITE, you can pre-load a font and use it with any software, including BASIC (right-justification is only possible with ALLWRITE, however).

Each disk contains at least eleven fonts and supporting programs. The disks cost $59.95 each, and we offer substantial discounts to ALLWRITE owners. Please call or write to us for print samples, further information and pricing. Due to the specialized nature of this product, we recommend that you see the samples before ordering. Disk formats are available for TRS-80 I, III, 4, and MS-DOS. ALLWRITE is available only for TRS-80.

Information on these products is not available at our toll-free answering service, so please call or write to our Technical Support group for details:

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80 formats its program listings to run 64-characters wide, the way they look on your video screen. This accounts for the occasional wrap-around you will notice in our program listings. Don't let it throw you, particularly when entering assembly listings.

Article submissions from our readers are welcomed and encouraged. Inquires should be addressed to: Submissions Editor, 80 Pine Street, Peterborough, NH 03458. Include an SASE for a copy of "How to Write for *80 Micro*." Payment for accepted articles is made at a rate of approximately $50 per printed page; all rights are purchased.

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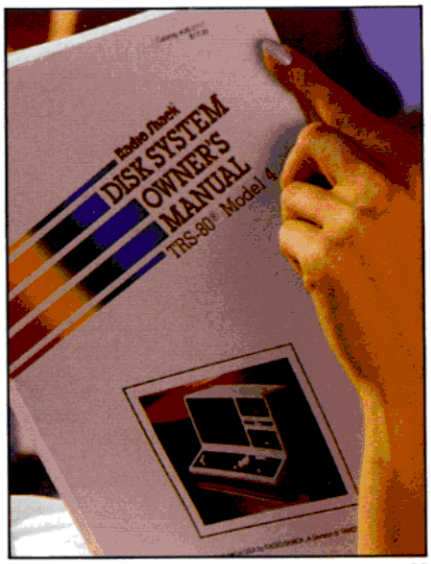

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by L.H. Southmayd

112. Tidbit #26

114. Express Checkouts
Pro-Create 4.3
Microsoft Word 2.0
The Norton Utilities 3.0
Mod-4 by Jack

118. New Products

125. MS-DOS New Products

128. Ask Tandy

LOAD 80

Load 80 gathers together selected programs from this issue of *80 Micro* and puts them on a magnetic medium for your convenience. It is available on tape or disk, and runs on the Models, I, III, and 4.

Load 80 programs are ready to run, and can save you hours of time typing in and debugging listings. Load 80 also gives you access to Assembly-language programs if you don't have an editor/assembler. And, it helps you build a substantial software library.

Using Load 80 is simple. If you own a tape system, load the Load 80 tape as per the instructions provided. If you own a Model I or III disk system, you boot the Load 80 disk and transfer the files to a TRSDOS system disk according to simple on-screen directions. If you own a Model 4, copy the Model 4 programs from the Load 80 disk to your TRSDOS 6.X disk using the COPY command.

Not all programs will run on your system. Some Model III programs, for instance, will run on the Model 4 in the Model III mode, but not in the Model 4 mode. You should check the system requirements box that accompanies the article to find out what system configuration individual programs require.

If you have any questions about the programs, call Keith Johnson at 603-924-9471. Yearly subscriptions to Load 80 are $199.97 for disk, or $99.97 for cassette. Individual loaders are available on disk for $21.47 or on cassette for $11.47, including postage. To place a subscription order, or to ask questions about your subscription, please call us toll free at 1-800-343-0728 between 9 a.m. and 5 p.m. Or, you can write to Load 80, 80 Pine St., Peterborough, NH 03458.

Directory

Menu, Clock

Article: Summer Romance (p. 38).
System: Model 4, 64K RAM.

Menu sequencing and clock display routines.
Language: Disk Basic.
Cassette filespecs: B, C.
Disk filespecs: MAINMENU/BAS, CLOCK/BAS.

Times2

Article: The Great Divide (p.62).
System: Model 4/4P, 128K RAM, LDOS 5.1, EDAS editor/assembler.

Run two programs simultaneously and swap back and forth between them.
Language: Assembly.
Cassette filespec: TIMES2/CMD (object code).
Disk filespecs: TIMES2/SRC (source code), TIMES2/CMD (object code).

Patch

Article: Patch Work II: The Sequel (p. 72).
System: Model III, 32K RAM, TRSDOS 1.3.

This Basic program creates a JCL file that installs up to 13 TRSDOS 1.3 patches.
Language: Disk Basic.
Cassette filespec: D.
Disk filespec: DOMAKER/BAS.

Pixel

Article: Upgraded Graphics (p. 76).
System: Model 4, 64K RAM.

Add the graphics commands Point, Set, and Reset to Model 4 Basic. Includes a demonstration program.
Language: Disk Basic.
Cassette filespecs: E, F.
Disk filespecs: PIXEL/BAS, PXLDEMO/BAS.

Window

Article: The Next Step (p. 98).
System: Model 4/4P, 128K RAM, ALDS editor/assembler.

Window system user interface; third in a three-part series.
Language: Assembly.
Cassette filespec: WU (object code).
Disk filespecs: WU/SRC (source code), WU/FLT (object code).

Bond

Article: Spreadsheet Beat (p. 108).
System: Model III, 48K RAM, VisiCalc.

Calculate bond yield to maturity for regular and zero-coupon bonds.
Disk filespec: BONDYTM/VC.

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Word Processors Don't Improve Writing

If you read the IBM PC magazines, you might have seen the Leading Edge Word Processor ad that features a picture of Abraham Lincoln and the opening lines to the Gettysburg Address. The point of the ad is never entirely clear, but along the way Leading Edge marvels at how "the great ones" were able to "record huge hunks of Truth" with nothing more than "primitive" scraps of paper.

"The amazing thing is that these monumental processors of words, did it without the benefit of monumental help," Leading Edge says with open-eyed wonder. That "monumental help" turns out to be (surprise!) Leading Edge's word processor.

Never mind that the ad includes several examples of incorrect punctuation, including the renegade comma in the sentence quoted above. You don't have to worry about such trifles when you're talking about huge hunks of Truth. I'm not as bothered by the sloppy writing as I am by the sloppy thinking, the notion that word processors somehow liberate creativity that heretofore could only be sucked laboriously from the well of imagination with a rusty old hand pump.

Personally, I don't find comfort in the thought of Lincoln using a word processor. I have an image of Abe on the eve of his Gettysburg appearance discussing matters with an aide:

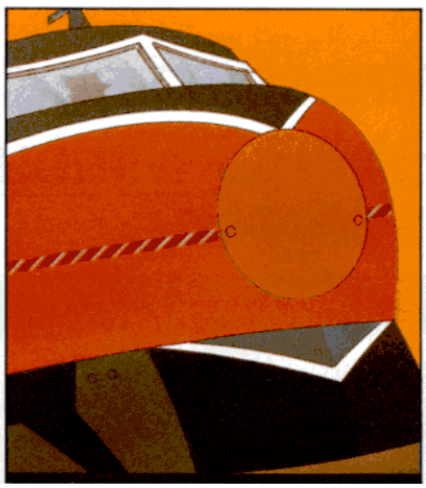
Aide: Is your address done yet, sir?

Lincoln: Nah. I'll just bang it out on my 100 on the way there, and read it from the LCD.

Aide: But sir, we were hoping we could merge the file with our mailing list, and send out personalized copies to the press.

Once Lincoln did generate (as opposed to "write") the speech, he probably would have edited it to read something like "Eighty-seven years ago, our ancestors started this nation with the idea that everybody should be free and that we're all the same." How could he resist all those advanced editing capabilities?

The Leading Edge ad perpetuates the myth that word processors improve writing. Buy this software and you, too, can express yourself as Abe did. Well, that's not true. Good writing comes from the marriage of insight and articulation;



it's the ability to see the world with new eyes and share your vision with others. A word processor will not help. If you have nothing to say, all the software will do is let you say it with justified type and automatic footers.

In fact, I'll go one step further: Word processors can in some cases be counterproductive. They can break down healthy patterns, encourage sloppiness and lassitude, and turn the rough, unpredictable landscape of the mind into a suburb of seamless lawns and climate-controlled shopping malls.

I want to emphasize "in some cases." I won't argue that word processors are terrific for journalists, hack writers, white-collar workers, and secretaries, for whom time and volume is important.

I speak more for the craftspeople who recognize that while content precedes form, form can give shape, color, and texture to content, much as a climate stamps those who live in it.

This is why many writers are almost obsessive about the tools with which they work. The wrong size paper, a pen that feels funny, a different chair—they can stop a writer dead in his tracks.

I've noticed a change in my own writing over the last several years. Once upon a time, when all I used was a typewriter or notebook, I would spend days writing a piece in my head before I committed it to paper. When I finally sat down at my desk, I knew exactly what I wanted to say and how I wanted to say it. The result was usually quick, simple prose set down in a single draft.

As I've come to use a word processor almost exclusively, the discipline of that pattern has slowly dissipated. I find myself approaching a writing task with hardly an idea of what I'm going to say, and not much concern about it. Why should I worry? If I don't like how these little pixels are arranged, I can just turn them off and light up another string, until I find a combination that suits me.

The result is often a partly conceived or vaguely expressed idea, an idea that I might have discarded if I'd first exercised it in my mind.

As I struggle to figure out what I'm going to say, I end up with a lot of time on my hands, time that invites excessive dawdling. So I occupy myself with the trivial tasks of writing—correcting typos, replacing words with ones that seem just a little bit better, inserting paragraph marks, and the like. I can make believe I'm working when in fact I've shut my brain off, like a would-be musician who spends all his time tuning his guitar instead of playing it.

Lingering over your writing has another unhealthy side effect—it encourages excessive polishing. I can spend so much time looking for the perfect word, the perfect phrasing, the perfect cadence that I drain the life from my prose; it's as smooth and hard as ice, but also as cold.

So what am I going to do about it? Alas, like so many others, I'm hooked on word processors like I'm hooked on electric lights and a car (I haven't surrendered my wood stove yet). I know the spiritual benefits of living closer to the primal technologies that nature bequeaths us, but am seduced by the material gains granted by the grosser technologies of modern life.

I have pledged, however, to return my Hermes 3000 manual typewriter to my desk at home. By day, I'll be a high-tech word-cruncher; by night, a sensualist indulging in the rich pleasures of the language. I'll do so having learned this lesson: No matter how efficient and productive a word processor can be, it will never inspire a thought, or capture a feeling, or express an idea. I'll have to handle those jobs myself. ■

Golden Template

Finally! Why didn't you think of it before? Spreadsheet Beat bodes to be your most useful column yet. What I'd like to see is a good check register template for Multiplan.

Andy Chaktires
Ventura, CA

Readers can submit their templates to Spreadsheet Beat c/o 80 Micro, 80 Pine St., Peterborough, NH 03458. We pay $50 for each one we use.

—Eds.

Tax Relief

Your March issue contained the only comprehensive article I've found on home computer income tax deductions. "Reasonable Deductions" by Lake, Golden, and Lett is clear and concise, and the examples are excellent.

G.C. Stanberry, Jr.
Houston, TX

Let the Games Continue

I think you're making a big mistake in discontinuing your annual games issue. You say games are now on the bottom of your readers' want list. What about readers like me who looked forward to the games issue? Are we going to be left out in the cold? I used to think your magazine was great because you covered all areas of computing: business, games, hobby, and so forth. But now it seems you're focusing only on business.

Randy Landgraf
McMinnville, OR

We're not dropping games altogether; we'll continue to publish them from time to time.

—Eds.

Line Item

In the February 1985 Basic Takes (p. 108), Richard Ramella makes the misleading statement, "...lower line numbers save memory...." Actually, Basic stores a tokenized line with a 2-byte hexadecimal line number, regardless of that line number's size. It is only those relatively infrequent GOTO and GOSUB lines that store the following number in a multibyte ASCII format. Therefore, if a program doesn't contain any GOTO or GOSUB lines, renumbering will not save space. Also, newer GW-type Basics store even GOTO and GOSUB lines in a tokenized 2-byte format, so you can't reduce memory requirements due to renumbering.

Frank Vanslager
San Jose, CA

I appreciate Mr. Vanslager's correction. The Model 4 and Tandy 1000 Basics don't give the results I indicated. Readers can use a simple test to determine if their computer can conserve memory by renumbering Basic listings. Type in:

```
50000 GOTO 50010
50010 END
```

Run the program, then type in your computer's command for displaying available memory, either PRINT FRE(0) or PRINT MEM, and press the enter key. Write down the number that appears. Erase the listing and type in and run the following program:

```
1 GOTO 2
2 END
```

Once more, display available memory; if the first number is higher than the second, you can save memory by using lower line numbers.

If memory isn't a consideration, don't bother to renumber. But many users are still working with only 16K of memory. Sometimes they need, for example, to clear a few more bytes for strings, and this is a way to wrench that memory out of a long listing.

Richard Ramella
Chico, CA

80 Micro's BBS is open 24 hours a day. It offers programs you can up- and download, special-interest groups, and a classified section. You can reach the board at 603-924-6985; UART settings are 300/1200 baud, 7-bit words, 1 stop bit, and even parity.

Tandy Si

After reading the May 1985 Input page, I felt the desire to say a good word for Tandy and the Radio Shack people. Just over a year ago, I acquired a Model 4. I had never had my hands on any computer of any make or model. The Radio Shack staff struggled through my learning period with me, and I have nothing but praise for them. After all, why should a 74-year-old man be starting out to learn to operate a microcomputer?

Now I'm using a payroll package, Scripsit, VisiCalc, and General Ledger. As far as I'm concerned, the Model 4 is a good piece of hardware, and I have been pleased with the DWP-210 printer that I bought. Some day I may outgrow it.

R.T. Vaughn
Nashville, TN

CP/M No

You can find myriad applications programs that run under MS-DOS, TRS-DOS, and PC-DOS for business, education, math, communications, aviation, medicine, stamp collecting, and so on. Also, under those operating systems, which are easy to learn, remember, and use, you can develop and write programs in Basic, Pascal, C, Fortran, Cobol, Forth, and Assembly language.

So what is all this hype and hoopla about CP/M being now available for certain computers? Public domain programs? They lack documentation and are therefore of limited use. If computing is to go forward, we nonprofessionals need simpler systems, not expanded availability of a difficult-to-learn, complicated operating system like CP/M. One can hardly go forward by taking a backward step.

E.A. Morris
Sparta, NJ

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- ☑ Same performance as very expensive units.
- ☑ Super efficient: About 50 bytes per sentence.
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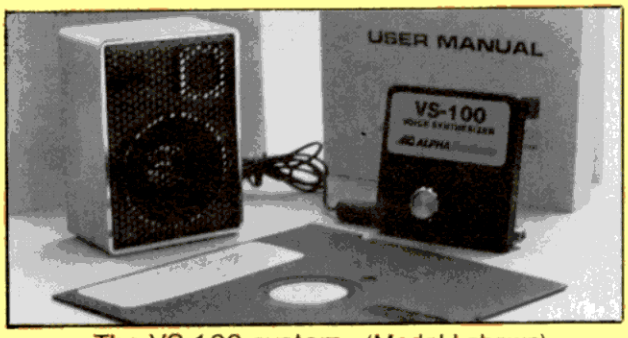
- ☑ Detailed 48 page manual.
- ☑ Ready to plug in and talk right away.
- ☑ Uses the famous Votrax SC-01 with 4 pitch levels and automatic inflection.
- ☑ Built in audio amplifier with volume control.

See the detailed review in 80-Micro December 1984.



The VS-100 system. (Model I shown)

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Includes:
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Specify Model I, III, 4 or 4P.

Model 4P needs short 50 pin extension cable 14.95

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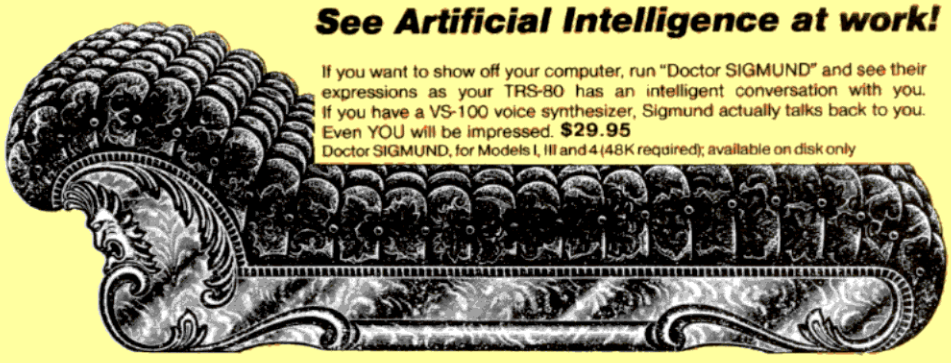

If you want to show off your computer, run "Doctor SIGMUND" and see their expressions as your TRS-80 has an intelligent conversation with you. If you have a VS-100 voice synthesizer, Sigmund actually talks back to you. Even YOU will be impressed. **$29.95**

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Send your questions or problems dealing with any area of Tandy/Radio Shack microcomputing to Feedback Loop, 80 Micro, 80 Pine St., Peterborough, NH 03458.

Q: My students use cassette-based Scripsit modified to run at high baud rate. This speeds up operation and hasn't caused any problems with reliability. I use disk Scripsit 3.2 and would like to be able to load students' high-baud tapes or write to tapes they could use. What modification makes the program set the cassette recorder to high? *(K. Edward Renner, Dalhousie University, Halifax, NS)*

A: Here's a patch that modifies Scripsit 3.2 for high baud rate:

PATCH SCRIPSIT/CMD (ADD=5308,FIND=AF321142,CHG=AF320000)

And here's the same patch for readers using Scripsit 1.0:

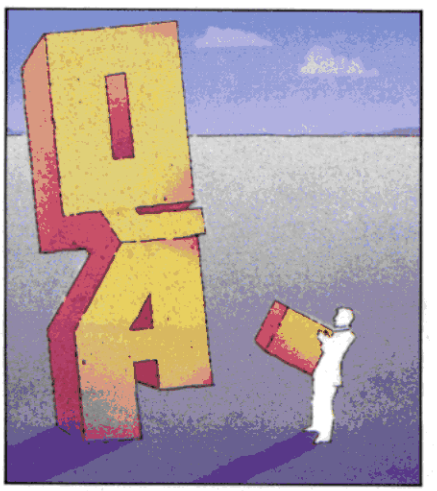
PATCH SCRIPSIT/CMD (ADD=5222,FIND=AF321142,CHG=AF320000).

Q: I have a 128K Model 4P and a dual-drive 48K Model III with Radio Shack's double-density board. I have several questions about software and hardware.

First, I want to install Radio Shack's Scripsit Spelling Dictionary with SuperScripsit, but I'm missing the Install program. Can you describe how to install the dictionary?

Second, I've transferred Radio Shack's Haunted House from tape to disk, but the program comes in two parts. At the end of part 1, the message "Ready cassette–hit enter when ready" appears. I've located the message using Debug, and I want to change it to read "Loading second part–standby" and then call the second file and have it start execution. Although I appended part 2 to part 1, I'm unable to start executing the second part without going to DOS and typing in its filename. Any ideas?

My third question deals with Radio Shack's MicroChess program. I want to transfer it to disk but haven't succeeded, even with these utilities: COPY2/CMD, Tapedisk/CMD, Transfer/CMD, Whatzit/CMD, T2D2/CMD, Super Utility 2.2Z, and TRSDOS 2.7DD's Tape command. Can it be done?



Fourth, can I use my Model I disk drives and a four-connector disk drive cable to make my 4P a four-drive system? My Model I drive zero has a power supply that operates drives zero and 1; would I need any additional equipment?

Finally, I'm thinking about getting an Aerocomp 30-megabyte hard disk drive to use as my primary drive, but I'd like to format and run the following operating systems on it: TRSDOS 6.2, LDOS 5.1.4, and Montezuma CP/M 2.2. I have TRSDOS 6.2's and LDOS 5.1.4's hard disk initialization routines. Can you describe the procedure for partitioning the hard drive for these systems? Do I need Montezuma Micro's hard disk drive support package to do it? *(William Kirksey, Corpus Christi, TX)*

A: You're using SuperScripsit in Model III mode. Before you install the dictionary, back up your SuperScripsit and Scripsit Dictionary disks. You should have a Proofread disk; back it up, too. Boot up the SuperScripsit disk in drive zero; at TRSDOS Ready, remove the disk and put the Proofread disk in drive zero. Put the Dictionary disk in drive 1. Type in KILL SPEDIT:1 and KILL CHECK/CMD:1, then type in COPY PROOF/CTL TO PROOF/CTL:1. That's all the Install program does: install the Proofread Control file on the dictionary disk after making some space for it.

As for Haunted House, I don't believe you can do what you want. The second part of Haunted House is supposed to run at a lower location in memory than where you have it. Moving it higher, as you've done, makes some of the machine-language jumps incorrect. You need to add a short machine-language program to the end of part 2 that moves it to its proper location, then jumps to part 2's execution address. And you need to modify part 1 so that it automatically jumps to this machine-language routine when part 1 finishes.

I don't know about MicroChess—does anyone know how to get it to disk?

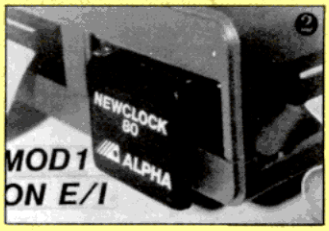
About those extra drives. I've finally discovered why it's so hard to put external drives on the 4P: The pins for those two drives aren't even connected to anything on the controller board. The Q2 and Q3 outputs from the floppy disk controller chip are left unconnected. To add external drives, you must go into your computer and hard-wire the outputs from Q2 and Q3 to an inverter chip and then onto the staking pins that your drive cable uses. You also need a new drive cable. You can't use the old Model I cables because the 4P uses a double row of 34 staking pins on the drive controller board to connect to the disk drive cable instead of an edgecard connection.

To use the hard disk drive with Montezuma Micro's CP/M you will, of course, need their hard disk support package. The operating system manuals describe the procedure for partitioning the hard drive. Basically, you lie to the operating systems about how much memory is available on the hard drive and where each system is supposed to find its section. The operating systems won't be able to share sections. CP/M won't recognize TRSDOS's sector/platter partitioning and vice versa, so each system will have access to only a portion of the hard drive's surface.

Q: My questions concern the Tandy 1000's TEAC disk drives. As configured, they use the TEAC 54B double-density, 40-track, nine-sectors-per-track format. I recently bought two TEAC 55F quad-density 80-track drives and would like to install them in my Tandy 1000. TEAC gave me the following DIP (dual in-line package) shunt configuration: DS1, HM, IU, and SM on both drives, with drive A having the termination.

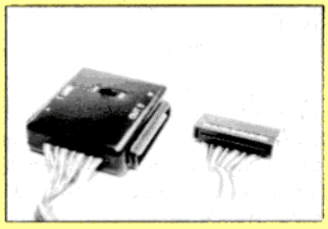
After trying this configuration and several other combinations, I still can't get my system to boot up. I receive either

Newclock-80 $69.95



The right time at the right price! Keep the time and date with quartz accuracy, even when your computer is off. The backup lithium battery (included) will last for over 2 years. Software on tape or disk, please specify. Use "TIMESET" once to set the clock. Use "SETCLK" to set your computer's internal clock (at power up) or use "TSTRING" so that the "TIME$" function reads the Newclock.
Connection: Model I: plugs into the keyboard or expansion interface. Model III: plugs into the 50-pin I/O bus. Compatible with all operating systems.

Printswitch $59.00

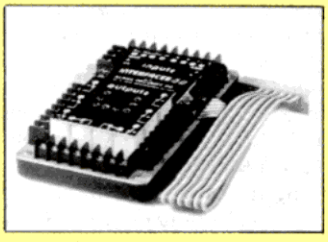


Do you have 2 printers? Get a Printswitch. Stop plugging and unplugging those printer cables. With the Printswitch, you can have 2 printers connected to your computer and you can select either one at the flick of a switch. Works with any printer, plotter, or device that uses the parallel printer port. Simply plug the 14 inch Printswitch cable into your computer, and plug your existing printer cables into the Printswitch. This is the nicest unit on the market. Superior quality board with gold plated edge connectors. For Models I,III, 4 and 4P.

Alpha Joystick $27.95

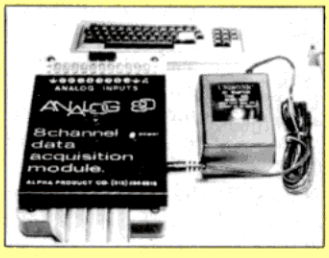
When it's time for fun, don't be without your Alpha Joystick. Do you know that most action games are Joystick compatible? Stop pounding on your keyboard and enjoy real arcade control. The joystick can also be used with BASIC programs; simply do J=INP(0) to read the joystick position (8 directions and fire button). Model I: plugs into keyboard or expansion interface. Model III, 4 and 4P: plugs into 50-pin I/O bus. The Alpha Joystick comes fully assembled and tested, ready to plug in and enjoy. (Specify Model I, or Model III,4).

Interfacer-80 $159.00



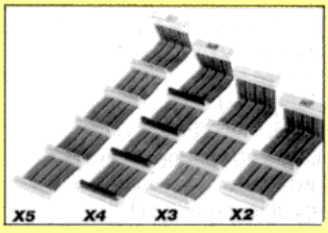
Low cost input and output device. The outputs consist of **8 relays** (rated 2 Amp @125V), easily controlled using "OUT" commands. For example, OUT 0,0 turns all the relays off. Eight LED's show the states of the relays. The **8 inputs** are optically isolated, so it's safe and easy to connect external devices (switches, sensors, thermostats, etc.). Simple "INP" commands read the inputs.
Connection: Mod I: 40 pin bus. Mod III, 4, 4P: requires 50-pin I/O bus converter ($39.95), plugs into 50-pin I/O bus. Comes complete with power supply, cable, and detailed manual.
(Up to 8 interfacers can be connected to your TRS-80 using our Y- cables).

Analog-80 $139.00



8 channel 8 bit Analog to Digital converter. Your TRS-80 can read voltages, temperatures, pressures, light levels, etc. • Input range: 0 to 5.1 Volts. • Resolution: 20mV. • Conversion time: 120 microseconds. In BASIC, you can take up to 100 readings per second. • Port address: selectable. Up to 8 Analog-80's can be connected to your TRS-80 for a total of 64 channels!
Connection: Model I: 40 pin I/O bus. Model III, 4, 4P: requires 50-pin bus adapter ($39.95). Comes complete with power supply, cable, and manual.

Special Cables



Disk drive extender cable (8")...C160:$9.95
Y-Cable for Mod I bus (40 pin): • **X2-40**...$29 • **X3-40**...$44 • **X4**...$59 • **X5**...$74
Y-Cable for Mod 3 & 4 bus (50-pin): • **X2-50**...$34 • **X3-50**...$49 • **X4-50**...$64
Disk drive cable (34 pin): • 2-drive...**C162:**$32 • 4-drive...**C163:**$45
Extension cable, 4 foot: • For printer and drive (34-pin)...**C165:**$22
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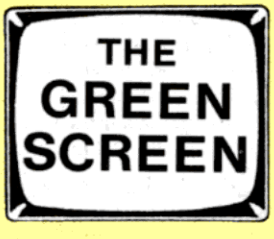
Green Screen $12.50



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a disk boot error message or a message to insert the disk. I've tried both MS-DOS 2.11 and PC-DOS 3.0, the latter supposedly supporting quad-density format. Will the 1000's disk controller recognize the higher density drive? If not, can you suggest a suitable replacement? Without technical documentation for the 1000, I can't proceed with this upgrade. *(Donald J. Mangold, Verona, NY)*

A: Are you trying to boot an 80-track disk? If not, that's probably your problem. Eighty-track units have twice as many tracks in the same amount of space as 40-track drives. With a 40-track disk in an 80-track drive, the drive is still reading the 40-track disk's first track when it moves to the second track. To make this work you must force the 80-track drive to increment two tracks instead of one. Unfortunately you can't do this with a hardware modification. The only solution is temporarily to put one of the 40-track drives back on-line as drive zero and to format and make a system back-up to the 80-track unit using the DOS SYSGEN command (see the manual for details). I believe you're supposed to set one drive to DS0 and the other to DS1. Double-check this with your technician as it's very important. If I'm right you have both 80-track drives configured as drive 1.

By the way, you can get Tandy 1000 technical manuals from Radio Shack's National Parts division (900 E. Northside Dr., Fort Worth, TX 76102, 817-870-5662.)

Q: Can you tell me who makes the CPU for Radio Shack's DMP-120 printer? The service manual lists the CPU as manufacturer's part number 2420NPEP159 and the label on the CPU reads "TEC 8403PX EP-159 Japan 7802068." When I asked Radio Shack's Consumer Service department about it, they said they couldn't give the manufacturer's name because it's a trade secret!

I opened the printer to repair a bad print head, and after that I started studying the CPU with a scope. I am slowly figuring it out but could go faster and better with a specifications sheet.

After less than an hour's use a print-hammer coil and its transistor went out. The coil, which normally has a resistance of 17 ohms, had heated enough to melt its plastic form and shorted to 1 ohm. What could cause such a thing in a new printer? *(Jack Stuntz, Ft. Collins, CO)*

A: TEC stands for Tokyo Electronics Co. They're at 222 Kearny St., San Francisco, CA 94108; they make the DMP-120's CPU.

I can attribute such a printer failure only to a defective part. I hope you made Radio Shack do the repair, as the failure was well within the 90-day warranty period for defective parts or poor workmanship.

Q: I recently bought a 128K Model 4. When I load TRSDOS 6.X into RAM, I have only about 28K left. My old Model I left me with 38K of RAM. I need at least 38K to run my programs. Do you know of a Model 4 operating system that will leave me enough working room? *(M. Mucciolo, Floral Park, NY)*

A: MULTIDOS or DOSPLUS gives you about that much room, with supply utilities that let you compress your programs to release more RAM for data and variable storage. Have you considered breaking up your program and using the Common and Chain commands to switch back and forth? That's what those commands are for.

Q: Several years ago, while in Japan, I bought a Model I from an authorized Tandy dealer. The equipment worked fine until recently, when drive zero started making a knocking sound. I took the bad drive to the local Radio Shack for repairs.

About five weeks later, when I asked about the drive, I was told the Radio Shack store wouldn't attempt to repair it without the proper schematics and repair manual, which were unavailable since the unit was manufactured in Japan. A label on the back of the drive reads, "Cat. No. 2601160A, Custom Mfd. in Japan for Tandy Radio Shack - AC 10V +/- 10%, 50/60 Hz." Do you know where I can get manuals and schematics for my equipment, or can you suggest another solution? *(Jon C. Schultz, Sandusky, OH)*

A: The only suggestion I can make is that you write directly to Tandy's Japanese division and ask for a service manual. Can anyone else help?

Q: I use a Model III with a DWP-410 printer. SuperScripsit's user print codes are causing trouble with proportional spacing and right-justified margin. Codes for characters such as ½, ¼, and @ make the printout line spill past the right margin. I double-checked the manual to make sure I was allowing the correct amount of space. What's wrong?

Also, when using Profile III Plus, I occasionally get an "I/O end of file" error when printing labels. This happens with one file only.

Finally, I'm considering getting a 10-megabyte hard disk drive to use with Profile III Plus. One file covers about 20 floppy disks and it would be best, I think, to keep this all together. Can I transfer data files to hard disk? Will Profile III Plus run from hard disk? What problems can I expect? *(Carl H. Sturner, Earlton, NY)*

A: This is the first I've heard of such a problem with SuperScripsit. Since the prescribed amount of room for your special characters isn't enough, have you tried incrementing the amount until you find the magic number that gives you perfect margins?

You obviously have a bad sector somewhere in that Profile III Plus file that's causing trouble. Try copying the file to a new disk. Or use a simple Basic program that loads each section of the file into memory and writes it to a new file name, displaying the information as it does so. This should help you pinpoint the bad area.

Yes, you can transfer your Profile III Plus files to hard disk. No, the version for standard floppy drives won't work off the hard drive. You have to buy a special hard drive version; it works just like the floppy version except that eveything defaults to the hard disk. You shouldn't have many problems once you get used to the new equipment.

Q: As you know, the Model 4P has no cassette interface. I suppose Tandy thought a portable computer user had no business fooling with cassettes. Unfortunately, I use a 4P as my main computer and I certainly do need cassettes. I have a good supply of Model I software that I can't use. Do you know where I could get information about building a cassette interface for the 4P? Since the unit already has the Model III ROM on disk, which should include the cassette routines, it should be relatively simple to build such a device. Model 4 mode is unimportant; I'm only interested in loading my old Model I software. *(Michael Czuhatewski, APO, NY)*

A: As yet, I haven't seen anything about a cassette modification for the Model 4P. One bit of warning though: Just because the 4P has a ROM image on disk doesn't necessarily mean the image includes the code for cassette routines. Can anyone help?

Q: I recently bought a kit to expand my Model 4P's memory to 128K. From the advertisement I assumed the kit would have instructions for both the Models 4 and 4P, but it contained instructions only for the Model 4.

I installed the chips in the empty RAM sockets and tried to access the new memory with MEMDISK. However, my computer displayed the message, "Unable to install MEMDISK, requested banks in use." I assume there's more to the upgrade than plugging in the eight 4164 chips. *(Greg Denson, Hoover, AL)*

A: There's more to it than just plugging in the chips. The Model 4 requires a PAL (programming array logic) chip to use the extra 64K.

The 4P doesn't need a PAL chip, but you must move the board jumper between pin E12 and E13 to pins E11 and E12. That tells the computer that the extra bank of RAM is available. Sounds as if you have something else already using that extra RAM.

After you've moved the jumper, try again. Begin at first base with just your DOS disk booted up: no special drivers, filters, or other programs in memory (the configuration routine disabled). Now try installing Memdisk using memory bank zero. If you get an error, something is wrong with Memdisk; bank zero doesn't use the extra RAM.

If you don't get any errors, turn off the computer and start again. This time choose just memory bank 1. If you again get the error, "Requested banks in use," its time to trouble-shoot the chips you installed. Are they all oriented correctly, with their notches all pointing in the same direction? Try removing them and reinstalling them in a different order. If Memdisk still fails, you'll have to contact Radio Shack, as something is wrong with the program, the computer, or the chips.

Q: I have a cassette-based Model I Level II that I'd like to convert to disk operation. What do I need, where can I get some drives, and what will it cost? Can I do it myself? *(Lawrence Kiefer, St. Ann, MO)*

A: Upgrading requires an expansion interface to provide the disk controller circuitry and extra memory. Unfortunately, Model I expansion interfaces are becoming as scarce as hen's teeth.

The only company I know of still making them is MicroMint (561 Willow Ave., Cedarhurst, NY 11516, 516-374-6793). Micro Data Supplies (22295 Euclid Ave., Euclid, OH 44117, 800-321-3552) used to sell the LNW Model I Expansion Interface, but I don't know if they have any left. If you're handy with electronics, a series of articles starting in the October 1982 *80 Micro* tells you how to build your own.

Once you have the EI, you need to get a disk drive zero. Several companies sell them; check the *80 Micro* ads. Drive zeros differ from other drives in that they contain a terminating resistor pack. This electronically protects the disk drives and floppy disk controller from spurious electronic noise and properly ties the drive cable data lines to ground. Without this terminating pack, you risk ruining the floppy disk or disk drive controller circuits or both.

As a matter of fact, you could try looking in the *Computer Shopper*'s classified ads. You might find someone willing to sell a Model I for less than it would cost you to buy an EI and new drives.

If you should get a Radio Shack EI, get Gold Plugs from EAP (P.O. Box 14, Keller, TX 76248, 817-498-4242). These solder onto the edge card connectors of your keyboard and expansion interface, eliminating corrosion that causes disk resets and data reliability problems between the keyboard, EI, and disk drives.

Next, get Aerocomp's Model I double-density board (Redbird Airport, Bldg. 8, P.O. Box 24829, Dallas, TX 75224, 214-339-8324). This doubles your drives' storage capacity and makes it much easier to run complex software. I've used their board in my computer for many years and never had a problem with it. It's also a snap to install.

Considering the cost of these items, however, it might be cheaper to buy a new Model 4 and upgrade it to disk drives instead.

Q: Your answer to Craig L. Cole's question about color expansions for the Model I (February 1985, p. 18) surprised me. You said you didn't know of any companies that made color boards for the Model I. The article "The 80 Goes Color" in the May 1983 *80 Micro* (p. 90) describes the construction of a high-resolution color board for the Models I and III. This board sounds made-to-order for Craig Cole. *(Dell M. Garner, Poughkeepsie, NY)*

A: Thanks for the reminder. Craig needs the June 1983 issue also, because the construction article was a two-parter.

Q: Our business college bought a Model II and a 20-megabyte hard disk drive from an individual; both are used but in good shape. Quality Computer Sevices originally sold the hard drive, but when we tried to register as the new owner, we discovered they were no longer in business. Our problem is that we have no documentation for the hard drive.

Due to an electrical problem, we glitched a portion of the boot, so we're unable to get a ready prompt and are locked out. Do you, or any of your readers, have some information on the Q.C.S. hard drive? One other question: We plan to run CP/M on the Model II and use the MUMPS language and the Fileman data base package. Also, we want to set up the Model II for more than one user. Is there a type of multiplexer we can use for multiple user access via the RS-232 port? Ideally, we'd want all users to be able to log on, but they'd have to share actual CPU time. One company recommended using a switching multiplexer with CP/M and said we wouldn't need a special operating system such as Xenix. But other companies say multiuser operation on a Model II isn't available without Xenix. Any ideas? *(Greg Casselman, Chillicothe, OH)*

A: Can't help you with the Q.C.S. Hard Drive; can anyone else?

Radio Shack originally designed the Model II as a single-person work station. Multiplexing the CPU to more than one person will slow down the computer somewhat. I haven't seen any field operations using the Model II as you propose, but you can do it. You don't want to use CP/M, though; use MP/M, the multiuser version of CP/M.

You'll have to contact Digital Research about the particulars, but I believe you can easily and simply set up the Model II to accept inputs from the RS-232 ports. This would support three users, one at the keyboard and two via the two RS-232 ports. The disadvantage is that this severely decreases the amount of RAM available to each user. In fact, I think you'll find that each user will have only about 16K to work with.

What might be better would be to get a multiplexer for the hard disk and let separate computers access the hard drive individually.

Q: I bought and installed a Mapper I kit from Omikron for my Model I so I could run CP/M-based programs. I followed their installation instructions, including the capacitor modification (I have the new type CPU), but I still can't run CP/M. The message I get is "DBOS ERR ON A: BAD SECTOR". It's definitely not the drive or disk; I tried three different disk drives; also I got the same result using the master disk. TRSDOS works OK, though.

Since it's my understanding that Omikron is out of business, can you or one of your readers help me solve this problem? *(George Verlinden, Westminster, CA)*

A: Since you can't get even the master disk to boot up, I suspect your master disk is blown. If the problem were hardware, I suspect that even TRSDOS wouldn't work right.

You need a new disk. Omikron is still around; they're just keeping a low profile as they try to recover from Chapter 11 and make good on all the orders they were supposed to send customers. Write to Paul Kelley, 1127 Hearst St., Berkeley, CA 94702, with a description of your problem and you should be able to get a new disk.

Terry Kepner is a freelance writer and programmer, and an 80 Micro associate editor.

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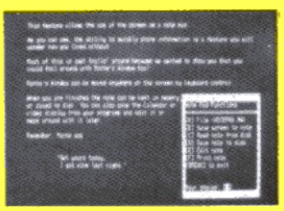
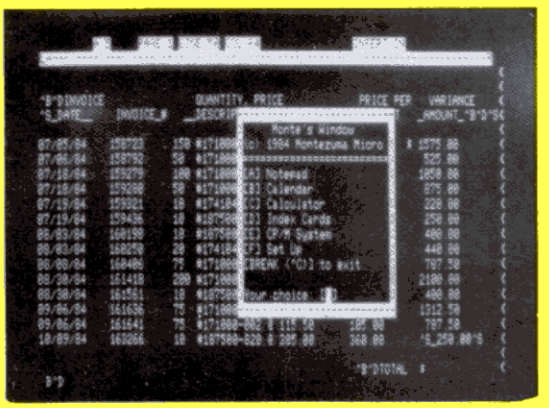
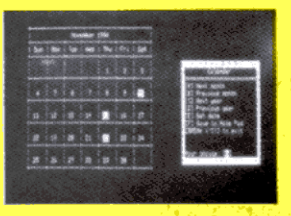




CALENDAR



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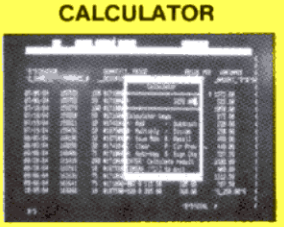

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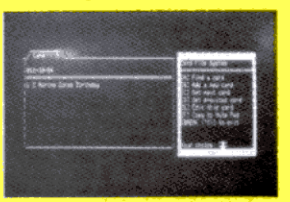

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Assign multiple drives to HD	**YES**	NO
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Tandy to 4P: Drop Dead

Tandyland

"The TRS-80 Model 4P went on sale on April 22, 1985, for $649.95 and will remain at that price until the last one is gone. We've stopped production on the product and when the last one is sold, there will be no more 4Ps."

So spoke Tandy's director of market planning, Ed Juge, confirming speculation that Tandy's 8-bit transportable was on its way out (see the Photo). Only a month before, Model 4 line manager Stewart Weinstock denied that Tandy planned to discontinue either the 4 or the 4P. As for the Model 4, Juge insists that the desktop still has a long life ahead of it.

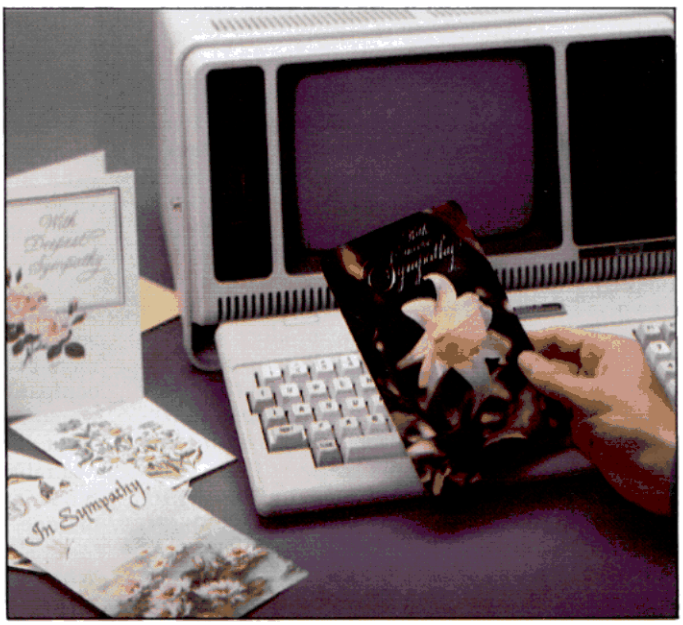

Photo. Time runs out for the 4P.

Juge said Tandy axed the 4P because "it was not a particularly hot seller," although he conceded that it has a loyal following. Juge added that 4P owners needn't worry about repairs and support. According to Tandy policy, parts will continue to be available for seven years after they sell the last machine. And as long as the Model 4 survives, users can find software for the 4P.

From the matter of the 4P, Juge went on to talk about Tandy's plans for MS-DOS computers. Stories in the *Wall Street Journal* and *Infoworld* last April cited speculation that Tandy would soon introduce two new MS-DOS computers: a portable, rumored to be the Tandy 800, and a PC AT clone, possibly called the Tandy 4000.

Juge called my attention to a statement by Tandy chairman John Roach summing up Tandy's attitude toward MS-DOS. Said Roach, "Obviously you've got to deduce that Tandy will stay in the forefront of the MS-DOS market and examine new products as the market evolves. In that way we will introduce products that make sense for us in that market."

But Tandy isn't in the clone business, according to Juge. When Tandy markets a product similar to another company's, he said, they try to take it further and make a better machine. "The only true clone we have is the Tandy 1200 and that was brought out because it was a good deal."

Juge said Tandy had no plans to bring out any new MS-DOS products before the end of summer, no laptops and no AT work-alikes. After that, we'll all just have to wait and see.

Price cuts on Tandy's computers were the rule last April. The Tandy 2000 and the 1200 each went down $1,000 in price to $1,999. The Model 12 was going for $1,595, and the Model 100 took another price cut. Even the hot-selling Tandy 1000 was ripe for a markdown. Securities analyst Joan McKay of Kidder Peabody indicated Tandy would probably drop the price of the 1000 by 25 percent. Tandy's John Roach seemed to concur. "It can't stay up there forever," Roach said, referring to the 1000's current price tag of $1,199.

All this price slashing is part of Tandy's new aggressive pricing policy. But even a $1,900 price cut might not be enough to keep the Model 12 alive. The low price sparked some interest in the 12 according to Tandy, but sales remained less than stunning. Competition from MS-DOS computers and from the remodeled Tandy 6000 hurt the 12's sales.

Still, the word from Tandy was that they wouldn't discontinue the Model 12 in the near future. Ed Juge explained the 12's huge price cut: "The cost of the Model 6000 has come down so dramatically with so much more horsepower that the price spread did not make much sense." In the past, an upgraded Model 12 cost $4,099 while the Tandy 6000 cost $4,495. Now Model 12 owners can upgrade for $3,395, a difference Tandy hopes will help move the machine off Computer Center shelves.

It wasn't all glad tidings when Tandy announced its third-quarter earnings. Overall sales for the quarter were $670.5 million, up from $656.1 million for the same quarter a year ago. But earnings per share fell to 25 cents from 60 cents in 1984.

The share earnings drop resulted from an $18 million write-off on computer hardware and software, goods that had declined in value since Tandy bought them. Tandy said declining prices for semiconductors and some computer subassemblies, as well as deterioration in market pricing of competitive equipment, made it prudent to write down raw materials and finished goods associated with the Tandy 2000. The write-off also included the cost of upgrading the Model 100 to 24K and the cost of some software associated with older computers.

The move might hurt Tandy's standing with investors, which had been high (see the June 1985 Pulse Train), but

John Roach sees benefits down the road: "This write-off of computer-related materials and products compensates for recent changes in market conditions and should permit us to continue to aggressively pursue our goal of providing outstanding value in microcomputer hardware and support."

Hot Items

Now that Tandy is committed to MS-DOS, some TRS-80 third-party software makers are following suit. Notable is Dallas-based Powersoft, which introduced an MS-DOS version of its venerable Super Utility disk-zapping package. In a simultaneous move, the company took the copy protection off the Model I/III/4 version and said it would provide Super U's /CMD file to registered owners for a small extra charge. The MS-DOS Super U costs $89.95 for first-time buyers; registered TRS-80 version owners get a $10 discount.

The Model I/III/4 version is widely considered an indispensable disk-repair utility, beloved by hackers and do-it-yourself types. In catering to the MS-DOS market, Powersoft took great pains to make the product easy to use and understand, even for users unfamiliar with disk-storage formats. Peter Norton's Norton Utilities has become the MS-DOS standard for saving disks and files. But TRS-80 owners are a loyal lot, and Powersoft is hoping their allegiance will help them find a place in Norton's neighborhood.

Powersoft's president, Dennis Brent, told me he wanted to avoid downgrading The Norton Utilities. In fact, Powersoft is pushing its new product not as an adversary to Norton's, but as a supplement that provides more utilities for saving files and reading blown disks.

While some old TRS-80 products are going MS-DOS, the opposite is also true. One of the trendiest MS-DOS applications, idea processing, is finally accessible to Model 4 owners in a product called Kamas. According to Adam Trent of Kamasoft, the program's manufacturer, Kamas works for people in text-intensive professions as an outline processor similar to ThinkTank, while at its highest level, you can use it to create custom applications, much like dBase II. At the time of the product's announcement, Kamasoft expected the program to run on the Models 4 and II/12/6000 running CP/M.

MicroTrends

Some of the big American micro-computer companies took their wares to West Germany last spring for Hanover Fair, the European equivalent of the Consumer Electronics Show. A number of hardware manufacturers, including Tandy, were showing Digital Research's new operating environment, GEM, on their equipment. Officially, however, Microsoft Windows is still the windowing product Tandy's backing. Microsoft didn't appear; in fact, its only obvious presence was through the many MSX (Japan's standard Microsoft operating system) machines at the fair.

Worldwide Microcomputer Word Processing Market, 1984

Word Processor	Market Share (%)	Units Sold
Wordstar	24	290,000
Applewriter	22	254,000
Scripsit	13	150,000
PFS Write	8	92,000
Magic Word	7	80,000
Easywriter	4	52,000
Multimate	4	51,000
Word Handler	4	50,000
Peachtext 5000	4	48,000
Perfect Writer	3	35,000

Table. Top word processors in worldwide market share.

Europeans seemed to be warming up to the 80186 technology Tandy pioneered in its Tandy 2000. Overseas firms showed interest in Intel's 80186 in anticipation of IBM's use of the chip in a new, low-end computer. The feeling in Europe is that IBM will use Intel's 80286 in the IBM PC II; the PC AT already uses the 80286.

One of the more interesting new product announcements to come out of Hanover Fair introduced Brother's Twinwriter 5, a double-action printer incorporating a daisy-wheel and a dot matrix printhead in the same housing. The daisy wheel puts out 36 characters per second (cps), while the dot-matrix alternative prints 140 cps. Brother is aiming the product at small businesses that need both printing capabilities.

Last year, word processors ac-counted for one-fourth of all applications software sold worldwide. According to Infocorp, 1.2 million packages went for an average price of $275, for a total of $300 million in sales.

The top five sellers in the word processing market worldwide included Radio Shack's Scripsit, which placed third with 13 percent of the market (150,000 units sold). Topping the list was Wordstar with 24 percent of the market, while Applewriter was a close second at 22 percent. PFS:Write was fourth with 8 percent; Magic Word with 7 percent came in fifth (see the Table.)

When I asked Tandy's Ed Juge about Scripsit's strong showing, all he would say is that the figures probably weren't too far off—Tandy doesn't release actual sales totals for their products.

Update

As this column went to press, word came in from Fort Worth that Tandy expected to start an Express Order Hardware service in July or August. EOH complements Tandy's existing Express Order Software service, through which customers can order non-Tandy programs from Radio Shack stores.

According to Tandy's Deborah McAlister, the EOH system will carry peripheral items such as add-on cards, cables, and other noncomputing devices. Negotiations with manufacturers were still underway when I spoke with McAlister.

Tandy's support for Digital Re-search's GEM operating system became more concrete late last spring. The two companies signed an agreement that would make GEM, a graphics environment manager for MS-DOS computers, available through Radio Shack's Express Order Software service starting in June.

What's new on the small computer scene? Confusion, that's what. A recent market study by Frost and Sullivan distinguishes among four categories of portable computers. The smallest of the small are the lap-tops, like Tandy's Model 100/200 line. Briefcase computers, like Hewlett-Packard's HP-150 or the Apple IIc, come next. Of course, lap-tops fit into a briefcase, and you can use a briefcase model on your lap. But never mind. The two remaining categories are transportables, like Tandy's discounted Model 4P, and Apple Macintosh-type computers.

Frost and Sullivan predicts 5.9 percent annual growth for the portable market overall, but market prospects vary wildly from category to category. For example, the study points to declining sales in transportables, bearing out Tandy's decision to stop making the 4P. Prospects for laptop sales, in which Tandy is the industry leader, are better, although the survey warns that revenues may fall.

The biggest growth from now through the end of the decade should come in briefcase-size machines—14 percent growth in dollars, and 24 percent in unit sales. As for the Macintosh, Frost and Sullivan expects it to become the number-one portable computer, with unit sales jumping from 200,000 in 1984 to 550,000 in 1989.■

Photographs by Frank Cordelle

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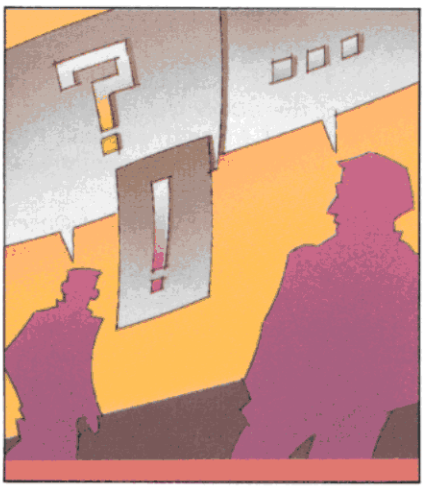
The Mad Patcher

Here's an improved version of one of my TRSDOS 1.3 patches ("Patch Work," January 1985, p. 112). Patch 8 modifies the Free command to give you the total number of free granules on a disk, but the patch also shortens a prompt in the rarely used Prot (PW) command. No big deal, but the patch below doesn't affect the Prot prompt:

```
PATCH *6 (ADD = 5483,FIND = 26,CHG = 3C)
PATCH *6 (ADD = 5526,FIND = 4D61737465
  7220,CHG = FE28D8F1C3FC5B)
PATCH *6 (ADD = 5D52,FIND = FE28D0,
  CHG = CD2655
```

You must install all three patch lines. Also, if you already have patch 8 in place, you must undo it by reinstalling the original patch, swapping the numbers in the three patch lines' Find and CHG fields.

For truly masochistic readers, I have a 29-line, wall-to-wall patch that inserts the CAT command in the TRSDOS 1.3 Help listing, replacing the nonfunctional Route command. I'll be happy to mail the patch listing to anyone who sends me a stamped, addressed envelope and a dime to cover copying costs. I'll also include the listing for an experimental patch that lets you run TRSDOS 1.3, once booted, from drive 1 in a two- or three-drive system.



Andy Levinson
11575 Sunshine Terrace
Studio City, CA 91604-3835

Look for a sequel to "Patch Work" in this issue.

—Eds.

Zap Gap

The Figure shows changes to David A. Williams' Disk Zapper ("Zap Master," April 1985, p. 62) for editor/assemblers other than MZAL. We'd like to thank Thomas E. Oakes of N. Liberty, IN for bringing them to our attention.

—Eds.

DD Diagnosis

I discovered a zap to Dave Stambaugh's Floppy Doctor diagnostic program—the zap lets Model I owners using Radio Shack's double-density modification test for single- and double-density operation. You make the zap to relative sector 223 on the diagnostic disk. I used NEWDOS/80's Superzap utility. If you use Superzap, make sure the drive you're using has the following single-density PDrive attributes:

TI = A, TD = A, TC = 35, SPT = 10, TSR = 3, GPL = 2, DDSL = 17, DDGA = 2

If the diagnostic disk is in drive 1, invoke Superzap and type in:

DD <enter>	(Display a disk sector)
1,223 <enter>	(Display sector 223 on drive 1)
MOD17	(Modify byte 17 in the sector)

Now, change

EC 37 36 FF 36 D0

to

EE 37 36 80 36 E0

by typing in the second set of 6 bytes. Press the enter key, press "Y," press the enter key again, and type in EXIT.

To use the modified disk for double-density testing, you must have the test disks in double-density format. Also, readers who don't want to alter their original diagnostic disks can create a

```
Change line 120 to:    120          ORG 3100H

Insert the following macro code expansions immediately
after the ORG statement:

          SVC     MACRO     #V1
                  LD        A,#V1
                  RST       28H
                  ENDM

          CPR     MACRO     #V1
                  SCF
                  CCF
                  SBC       HL,#V1
                  ENDM

          MOVI    MACRO     #V1,#V2,#V3
                  LD        DE,#V1
                  LD        HL,#V2
                  LD        BC,#V3
                  LDIR
                  ENDM

Depending on your editor/assembler, you might also have to
make the following changes:

In lines 1210, 1270, and 1400, change the code LD   BC,IX
to two lines:
                  PUSH    IX
                  POP     BC

In line 3270, change the code LD    HL,IX
to two lines:

                  PUSH    IX
                  POP     HL

You might have to change the labels MOD, MODA, NOT, and
NOTA if MOD and NOT are reserved words in your assembler.

EDAS users should also make the following changes:

      03910          DC        14,' '
      03920          DC        80,' '
      03940          DC        14,' '
      03950          DC        80,' '
      04280          DC        80,' '
      04290 CMD      DC        80,' '
      04300          DC        160,' '
```

Figure. Modifications to Disk Zapper for editor/assemblers other than MZAL.

Circle 85 on Reader Service card.

CONVERT
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Here's time and money saving news for thousands of TRS-80 Mod I and Mod III owners who would love to move up to state-of-the-art hardware! EMSI's conversion package contains utilities to solve both problems facing those who want to upgrade:

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And, Our thirty page user guide is packed with examples and hints showing how to make any manual program changes required after using CNV3TOPC.

So, there you have it. HYPERCROSS gets you "over there" and CNV3TOPC performs most of the required program changes. Sound too good to be true? Don't take EMSI's word for it. Here are excerpts from two magazine reviews. Note that since publication of these reviews, CONV3TO2000 V1.0 has been enhanced and consolidated with CONV3TOPC V1.0 into one package, namely, CONV3TOPC V2.0

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Table 1). For example, one command lets the compiler accept unnumbered Basic programs resulting in a faster final program; another lets you invoke a tracing function so you can follow program logic.

You can also use metacommands in your source code to spell out what you want the compiler to do. Metacommands control the source listing format and provide an Include facility; they're similar to Basic comment statements.

Performance

To its credit, Microsoft's compiler is easy to learn to use; in terms of function and program logic, it's highly compatible with Microsoft's other interpreters.

On the other hand, the performance of the generated code gets the lowest possible evaluation I can give it. In almost every instance, it performs slower than a Basic program when writing text to the video display, especially when writing in color.

I made a series of tests to see how the compiler performed. I tested full-screen graphics performance and text and graphics intermixed, speed of writing full 80-character lines in both color and black and white, and computational performance using the Sieve of Eratosthenes prime number generator.

The compiler produces graphics slowly. In four out of the six graphics tests, the interpreter handled information faster than the compiler (see Table 2).

If you have to print a lot of information to the screen, you're out of luck. The best performance you'll get out of the compiler is that either equal to the interpreter (MS-DOS 2.11) or inferior (MS-DOS 2.00 [see Table 3]).

The compiler handles quantities of data or computations fast. The compiler took only 0.8 seconds to complete the Seive of Eratosthenes test, while the interpreter took 81 seconds.

In addition to these results, I noted that the generated color graphics code simply would not run under MS-DOS 2.11. Apparently, Microsoft patched the compiler code generators to compensate for the inadequacies in the earlier operating systems.

The compiler exhibits a few other problems. The Clear Screen command doesn't always work. Midway into the program run, the screen turns into a jumble and is totally unusable.

The Color command for selecting inverse video doesn't work like the Basic interpreter's. You select inverse video for only a partial line with the interpreter, but the compiler inverses an entire line of text unless you turn on normal video at the end of the text. Also, I couldn't turn off the cursor in the color mode and it was annoying to watch it slowly jumping all over the screen.

Conclusion

I have used Microsoft's Basic compiler under CP/M and TRSDOS 6.X and haven't had any troubles with them. This review takes issue with its implementation on the Tandy 2000 and, specifically, the screen-handling routines.

Tandy promises an upgraded version of the compiler soon that should fix most of these problems and make it compatible with MS-DOS 2.11.

Unless you compile programs that only work in black and white, I can't recommend this compiler. Its performance is totally unsatisfactory.■

Category	Switch	Result
Conventions	/4	Compiler uses language convention of older Microsoft compilers.
	/T	Invokes execution conventions of older Microsoft compilers.
Error-handling	/E	Generates a line-number address map.
	/X	Maps each statement to a physical address.
Special switches	/A	Lists equivalent 8086 code for each source code line.
	/D	Generates additional code for debugging and error-handling.
	/N	Minimizes line-numbering constraints.
	/O	Generates references to alternate function library.
	/R	Stores arrays in row-major order.
	/S	Writes string literals to the output file.

Table 1. Special switches the GW-Basic compiler supports.

Program	Interpreter time (seconds)	Compiler time (seconds)
Graphics.BAS bar chart	2.8	8.1
Graphics.BAS curves	12.3	4.9
Graphics.BAS area plot	7.8	18.1
Graphics.BAS pie chart	11.4	23.4
American flag	9.1	10.3
Confederate flag	17.4	35.2

Notes:

- *The significantly faster time for the curves segment of Graphics.BAS is indicative of the compiler's performance in computations and should not be construed as graphics performance.
- *If you compile Graphics.BAS, you will get a run-time error indicating a type mismatch while drawing the area graph. This is caused by the Draw command's limitation.

Table 2. Color graphics performance of the GW-Basic compiler.

	MS-DOS 2.00.02		MS-DOS 2.11.01	
Screen mode	Interpreter (seconds)	Compiler (seconds)	Interpreter (seconds)	Compiler (seconds)
Black & white Mode zero	1.5	1.7	1.3	1.3
Color Mode 3	4.3	33.3	2.8	9.5

Notes:

- *This program consisted of a simple For...Next loop that counted from 1 to 24, performed a Locate for each video row, and then wrote a string of 80 characters. Screen mode was zero for the black-and-white tests and three for the color text tests.
- *Even though the times for MS-DOS 02.11.01 show significant improvement, this is attributed to the improved BIOS code and not the compiler. Further, the video screen was instantly set into bright yellow with bright white letters and could not be changed, making the screen virtually unreadable.
- *BASIC 01.02.00 was used under MS-DOS 02.00.02 and BASIC 01.03.00 was used under MS-DOS 02.11.01.

Table 3. Compiler performance writing text to the screen.

Three For the Road

by Mare-Anne Jarvela

If you often use a laptop computer to work out of your briefcase, you'll probably want to print out a document at some point. Portable printers will do the trick—they're small enough to fit in your briefcase and they run on batteries or ac power. You'll find a number of them available, both dot-matrix and letter-quality, in different price ranges and with various features.

I reviewed three portable printers, two thermal dot-matrix and one letter-quality (see the Photo). The thermal printers, the ThinPrint 80 and the Hush 80, are quiet but require special paper. The impact printer, the ThinType 80, works like a standard desktop printer and produces near-letter-quality text, but it's slow and noisy (see Table 4 for a list of specifications).

★★★★

ThinPrint 80. Axonix Corporation, 417 Wakara Way, Salt Lake City, UT 84108. $339.

Easy to use: ★★★★☆
Good docs: ★★★★☆
Bug free: ★★★★☆
Does the job: ★★★★☆

★★★★

Hush 80. Ergo Systems Inc., 26254 Eden Landing Road, Hayward, CA 94545. $159.99.

Easy to use: ★★★★☆
Good docs: ★★★☆☆
Bug free: ★★★★☆
Does the job: ★★★★☆

★★★½

ThinType 80. Axonix Corporation, 417 Wakara Way, Salt Lake City, UT 84108. $429.

Easy to use: ★★★★☆
Good docs: ★★★☆☆
Bug free: ★★★★☆
Does the job: ★★★☆☆

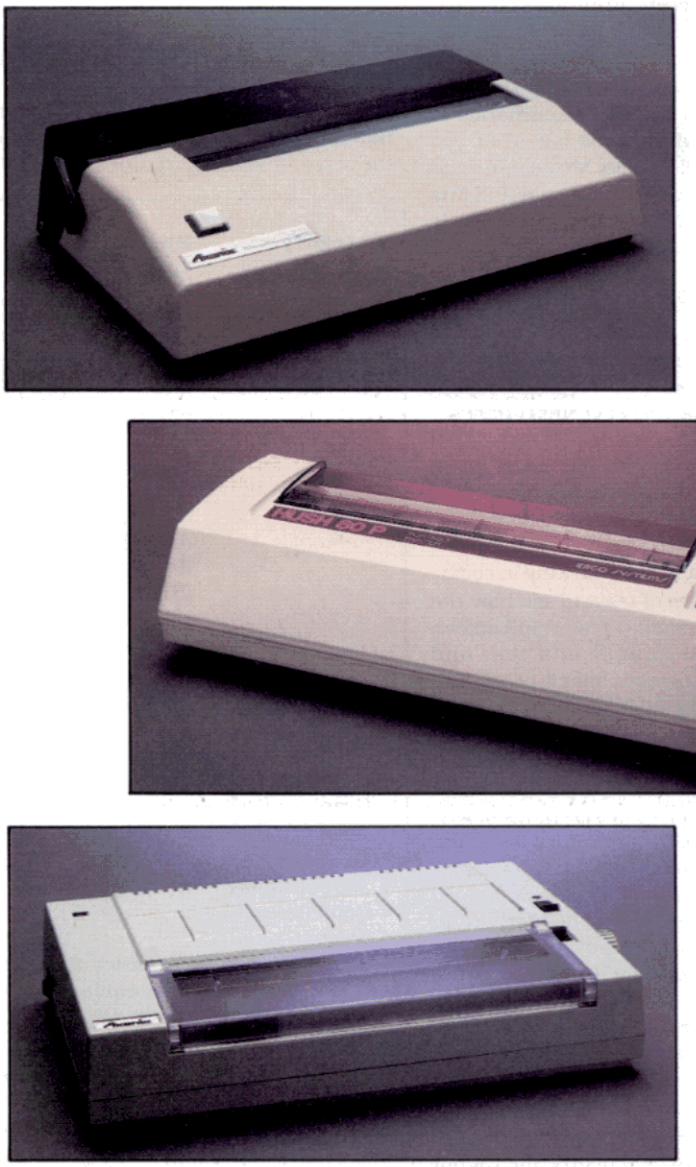

Photo. Three portable printers, from top to bottom, the ThinPrint 80, Hush 80, and ThinType 80.

The ThinPrint 80

The ThinPrint 80 is a compact thermal printer. It comes with either a parallel or serial interface and uses 8½-inch roll paper, handily stored inside the printer. A slide switch selects between the two print modes; normal 80 characters per line and compressed 136 characters per line. It also has continuous dot-addressable graphics capability.

This is a true intelligent printer with bidirectional look-ahead printing (after it prints one line left to right, it examines the next line in the buffer and selects the most efficient printing direction). You can adjust the print intensity by turning a small knob at the rear of the printer.

The ThinPrint runs on a built-in rechargeable NiCad battery pack and comes with a recharger. If you don't use the printer for two minutes, its auto shut-off feature kicks in.

You only have to worry about a couple of buttons with the ThinPrint, and you can easily get at the internal DIP switches to set up the printer. The manual is clear on this point and I didn't have problems getting the printer running.

Of the two thermal printers I reviewed, I liked this one better because it offered features that fit my needs, like intelligent printing and variable print density.

The Hush 80

This thermal dot-matrix printer is fast, quiet, and simple to use. Like the ThinPrint, it stores its 8½-inch-wide roll of thermal paper internally, so you don't have to carry it separately (you can't use single-sheet paper, though).

The Hush 80 comes in three configurations: serial- or parallel-interface and Commodore-compatible. The printer itself weighs only 25 ounces, the paper adds another 11 ounces, and the NiCad weighs 12 ounces. All told, the printer

Photographs by Frank Cordelle

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You can copy BASIC, PASCAL, FORTRAN, C, or other high level language programs, and run them with little modification, unless they make extensive use of graphics, or have machine language calls. CNVBASIC/CMD, available separately, will make most of the syntax and spacing changes required for converting Model I/III BASIC programs for use on other systems. Data files, spreadsheet files, and text files can also be usefully moved between machines. If you use or have the same Visicalc or Multiplan on the TRS-80, you can use the same files on other machines! These spreadsheet files are directly convertable to 123 and other calc-type programs. Of course, the combinations and possibilities are endless, and the flexibility is ALL there with SuperCROSS/XT!

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weighs no more than 3 pounds.

The Hush 80 prints at a fast 80 characters per second, and does it so quietly you could talk on the phone next to it. It supports 129 different characters, including international characters. You can choose from three printing modes: the standard 80 characters per line, expanded mode with 40 characters per line, and compressed mode with 160 characters per line. You can also print dot-addressable graphics.

The printer comes with an interface cable, a power cord with a 9-volt transformer, and a roll of paper. You can buy either a non-battery version Hush 80 or one with built-in NiCads for $40 more.

The printer's on/off switch is on the left-hand side of the unit, with the power cord socket inconveniently located underneath. The line-feed button is on the top right-hand side of the printer.

At first, I couldn't find the Hush 80's DIP switches to adjust line feed, and the manual didn't mention them. I called the company and they helped me find the switches (hidden under the printer's casing.) Ergo Systems has since moved the switches to underneath the front panel and the manual now explains how to set them.

Hush 80's features and price (half the price of the ThinPrint) make it a worthwhile buy.

The ThinType 80

If you need to print letter-quality documents on the road, the ThinType 80 is a good choice. Its printout is like that of a typewriter and it uses regular, single-sheet paper. But you pay for the quality: The ThinType is noticeably slower, heavier, and louder than the thermal printers.

The ThinType comes with internal rechargeable batteries, an internal ac adapter/charger, and a cable. It prints about 10 pages per charge and recharges in two hours. To help save battery time, the printer shuts off automatically if you don't use it within two minutes. You can order an external battery pack ($79.95) and a dc car adapter ($69.95), too.

The ThinType has a spin-wheel print head comprising five smaller wheels. The ink comes in an ink roll that's easy to replace and prints over 2 million characters.

The ThinType has two sets of power switches and indicator lamps. The ac switch is on the left, the dc on the right. The auto line-feed switch is located below the ac power switch. The printer cable goes into the back of the printer.

I had some problems getting the line feed to work correctly but after some trial and error, I managed to get it right. The ThinType 80's price and noise will make some people balk, but its print quality might override its drawbacks. ■

Specification		ThinPrint 80	Hush 80	ThinType 80
Price		$339	$159.99	$429
Dimensions (in.):	Width	11.5	11.6	11.7
	Depth	7.5	5.5	7.8
	Height	2.5	2.8	2.5
Weight (lbs.)*		4.25	3	7.5
Roll Paper		Yes	Yes	No
Single Sheet		No	No	Yes
Speed (cps)		40	80	15
Battery		Yes	Optional	Yes
AC		Internal	9 volt	Internal
Serial		Yes	Yes	Yes
Parallel		Yes	Yes	Yes
Self-test		Yes	Yes	No
Print type		Dot-matrix	Dot-matrix	Impact
Characters supported		95 ASCII	129 ASCII	96 ASCII
International characters		No	Yes	No
Characters/line		80	80	80
Character modes:				
Condensed		Yes	Yes	No
Expanded		No	Yes	No
Emphasized		No	No	No
Inversed		No	Yes	No
Underline		No	No	No
Tab		No	Yes	No
Bit graphic		Yes	Yes	No

*Weight includes batteries

Table 4. Portable printer specifications.

A Window On the CP/M World

by John B. Harrell III

★★★★★

Monte's Window runs on the Model 4/4P (128K) and requires Montezuma Micro CP/M 2.2 version 2.2X. Montezuma Micro, CP/M Support Division, P.O. Box 32027, Dallas, TX 75232. $49.

Easy to use: ★★★★★
Good docs: ★★★★★
Bug free: ★★★★★
Does the job: ★★★★★

Monte's Window is a valuable addition to any Model 4/4P owner with 128K who uses Montezuma Micro's CP/M. Like Borland International's famous SideKick package, Monte's Window gives you access to a single-screen note pad, calendar, calculator, index card file, and CP/M system functions at any time, even when you're working in another application.

Inside the Window

You activate Monte's Window by pressing both shift keys at once. You can call up a window any time, except with a CP/M system function active.

When you invoke a window, Monte's Window saves the current contents of the video screen, including the cursor location and screen information, in reverse video. When you exit a window (by pressing the control-C), the program restores your applications screen and your previous cursor location.

The note pad displays a single screen of data that you can edit, print out, or move to or from a disk. One notable option lets you copy your current screen to the note pad so you can manipulate it with Notepad commands.

Notepad's editor is a simple one, lacking many of the features of a full-fledged text processor, like an insert capability and search and replace. You can, however, clear the entire note pad and select reverse or normal video modes for it.

The text file Notepad creates measures 24 lines by 80 characters and terminates lines with end-of-line markers. If you call up a text file you created with another program and use it with Notepad, Monte's Window may wreak havoc with its format.

The calendar accurately displays any month in the years from 1700 to 2200. You can move forward or backward in time by month or year using commands displayed on-screen. You can also copy the calendar to the note pad to print it out.

Before Monte's Window displays a month, it scans the index card file for date-specific notations (meetings, appoint-

Continued on p. 113

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With a few simple keystrokes, you position the cursor anywhere on the screen and key in your desired changes simply and quickly. The somewhat slow BASIC edit feature is no longer requred. Go directly to the problem and make your changes. Grab a problem program line and make it an immediate statement that you entered for debugging and make it part of your program. Eliminate excessive keystrokes and save time. (Requires 2 drives to install)

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Learning to Love Model 4 Basic

When Tandy introduced the Model 4, many users who cut their teeth on Level II and Model III ROM Basic doubted that the 4's RAM-based Basic was anything but a giant step backward. You had to separate key words with spaces, you had no single-key editing commands, and you had fewer than 30K of free memory with which to work.

But first impressions aren't always good ones. After using the 4P, TRSDOS 6.X.X, and Model 4 Basic for over a year, I can say without reservation that this Basic is second to no other 8-bit version.

Let me explain what I've learned. I'll start by discussing how to get around Basic's limited memory, then look at Model 4 Basic's new and enhanced commands and functions.

Gimme Some Space, Man

Model 4 Basic lets you use variable names of up to 40 significant characters, and the names can include embedded key words. Thus, GRANDTOTAL, COMPANY.NAME$, and COMPANY.ADDR$ are all legitimate (the periods in the last two are undocumented but valid characters).

You pay a price for this versatility—you have to use spaces to delimit your key words. This, along with the longer variable names, means that you use more memory. But you'll find that in a year (or even in a week) your code will be easier to modify and maintain. For example, a line like this one requires no Remark statements to explain its logic:

```
10 IF SALES>BONUS.MIN THEN
   BONUS.AMT=SALES*.05
```

If you write a long program, or one that needs lots of memory for variable storage, you might have to break it up into modules. Fortunately, this is easy, since Model 4 Basic includes complete and simple program chaining facilities. You can pass any or all variables and file buffer descriptions to another program, and use the Merge option to integrate code with a program in memory.

Program Listing 1 uses Model 4 Basic's chaining capabilities in a menu sequencing program, one that can pass control and preset constants or open files to either a submenu or a processing program. Program Listing 2 shows a portion of a sample processing module, ENDDAY/MRG.

Lines 1000–59999 in the MAINMENU segment define the number of menu selections, the menu page title, and the selections proper. You would model subsequent submenus after these lines. The user function FNINV$(X$), defined in line 20, adds the leading and trailing video control codes needed for inverse video to its argument X$. A While. . .Wend loop validates the selection, after which line 150 chains in the proper file (menu or process) for the selected function.

You can follow the implementation of the Chain command in line 150 as follows. First, the program specifies the Merge option. Basic reads program lines contained in the ASCII file MRG.PRG$(n) from disk, encodes them, and then inserts them into the source code already in memory. This insertion follows the same rules as those used when you're writing a program: Basic will insert a line that does not exist and overwrites a line that does exist. The program starts with line 1000 of MRG.PRG$(n), and passes all variables to the new program.

The Delete command specifies that Basic should delete lines 1000–59999 in the original program before it merges the new code. Both the start and end lines used as arguments for Delete must exist or you'll get an error; thus, the REM statement in line 59999 is only a place holder.

The ENDDAY/MRG module shows how Basic would break the menu loop (line 1000) for actual data processing. Another command (Chain or, at this point, Run) would return to the main menu.

The Erase command (line 30 in Listing 1) completely removes an array from memory as though you had never dimensioned it. Consider a sort routine that builds an index array from a direct- (new word for "random-") access file, sorts it, and then writes the array to an index file. You no longer need the index array left in memory, which can now limit the size of any new arrays and precipitate more frequent and time-consuming garbage collection. The simple command ERASE TMP.SORT$ eliminates these nasty possibilities. One caveat—any array you want erased must exist or you'll get an error. You can use the Common statement in lieu of the All parameter in the Chain command. Basic passes only variables specified as its arguments to a chained program. This requires you to plan more carefully, but it does use memory most efficiently.

Some programmers are confused about the Common statement's function in a program to which they're chaining another. Common's only action is to pass variables to the chained program. Common in a chained program specifies variables you want to pass to subsequent code, and you don't need it to receive the first program's variables.

Quiz Time

Now that you know all about program chaining, here's a challenge for you. Using Alan Smith's Model 4 machine-language sort routine from the March 1985 *80 Micro* ("A Sort Story," p. 70), write a chainable sort routine that receives the sort array from your program and passes the sorted array back to the calling program (or on to another for further processing).

Here are some hints. In the calling program, include these lines:

```
COMMON SORT4ARRAY$(),ARRAY.SIZE%,
  NEXT.PROG$,START.LINE%
CHAIN "SORT4/BAS"
```

In the sort program, include these lines:

```
COMMON SORT4ARRAY$(), ARRAY.SIZE%
CHAIN NEXT.PROG$,START.LINE%
```

Notice that I specified the execution line for NEXT.PROG$ as a variable (START.LINE%). You can do this, too, but the program must declare the variable used as an integer value, either with DEFINT or by

LOAD 80

System Requirements

Model 4/4P
64K RAM
Basic

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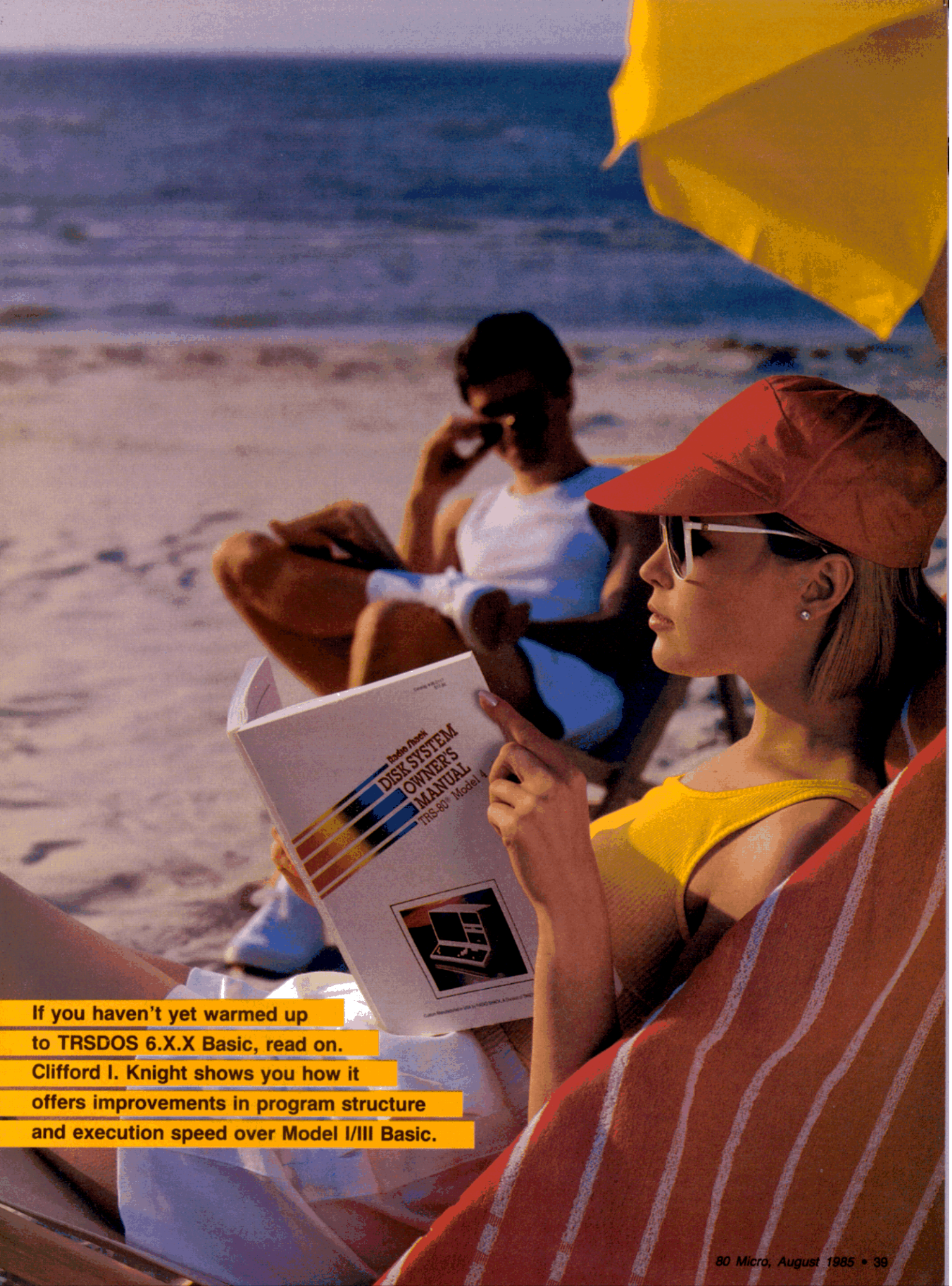

If you haven't yet warmed up to TRSDOS 6.X.X Basic, read on. Clifford I. Knight shows you how it offers improvements in program structure and execution speed over Model I/III Basic.

Program Listing 1. MAINMENU/BAS.

```
1   ' *** MAINMENU/BAS ***
10 CLS:DEFINT A-Z:DIM MRG.PRG$(1)
20 DEF FNINV$(X$)=CHR$(16)+X$+CHR$(17)
30 CLS:ERASE MRG.PRG$:RESTORE 59000
40 READ MAX.SLCT:DIM MRG.PRG$(MAX.SLCT)
50 READ TITLE$:PRINT TAB(40-LEN(TITLE$)/2);TITLE$
60 PRINT:PRINT:CTR=0
70 WHILE CTR<MAX.SLCT
80    CTR=CTR+1:READ MRG.PRG$(CTR)
90    PRINT SPC(20);FNINV$(STR$(CTR)+" ");" - ";
100   READ SELCT$:PRINT SELCT$:PRINT
110 WEND:PRINT@(22,10),"Enter Selection... ";:I=0
120 WHILE I<1 OR I>MAX.SLCT
130   I=VAL(INPUT$(1))
140 WEND:CLS
150 CHAIN MERGE MRG.PRG$(I),1000,ALL,DELETE 1000-59999
999 ' *** MAIN/MRG *** - save in ASCII format
1000 GOTO 20  ' entry for a menu module
59000 DATA 3,"MAIN MENU - XYZ Company"
59010 DATA "OEMENU/MRG","Order Entry System Menu"
59020 DATA "INVMNU/MRG","Inventory Control System Menu"
59030 DATA "ENDDAY/MRG","Start End of Day Sequence"
59999 REM
```

End

Program Listing 2. ENDDAY/MRG.

```
1 ' *** ENDDAY/MRG *** - save in ASCII
1000 ' end of day code goes here
2000 '...
50000 CHAIN MERGE "MAIN/MRG",1000,ALL,DELETE 1000-59999
59999 REM
```

End

Program Listing 3. Input routine without While. . .Wend.

```
10 I$=INPUT$(1)
20 IF I$=CHR$(13) THEN GOTO ??? (70)
30 IF I$<" " THEN GOTO 10
40 IN.LIN$=IN.LIN$+I$
50 PRINT I$;
60 GOTO 10
70 '... code continues here
```

End

Program Listing 4. Input routine with While. . .Wend.

```
10 WHILE I$<>CHR$(13)
20   I$=INPUT$(1)
30   WHILE I$>=" "
40     IN.LIN$=IN.LIN$+I$
50     PRINT I$;
60     I$=""
70   WEND
80   WEND:I$=""
90   '... code continues here
```

End

using the type specifier "%." Unfortunately, you can't pass deletion line numbers as variables.

I'll leave the discussion of chaining with these additional points. First, contrary to what the Model 4 manual implies, when you're not using the merge option, you don't need to save the program you've chained in ASCII format.

Second, when you use the merge option, you can't necessarily preserve user-defined functions. Basic stores and references user functions at their original location in the source code. Should the delete option remove the line containing the function definition, or if a merged program overwrites the definition line, that function ceases to exist and you'll get an error condition.

While. . .Wend

Listing 1 uses While. . .Wend, a structured programming technique long available in other languages. It doesn't do anything you can't do in Model III Basic, but it lets you write code that's easier to maintain.

Examine the input routines in Program Listings 3 and 4. In the first example, I had to complete the GOTO in line 20 after writing the code. Using While..Wend in Listing 4, I didn't. When you use a While. . .Wend loop, something must alter the value of the control variable (I$ in Listing 4), or the program won't break the loop. Line 60 does this by assigning the null string to I$. In line 80, Basic again clears I$ so that the program can reenter the routine. You can nest While. . .Wend loops (one inside the other as shown in Listing 4) to any number of levels.

I used Basic's new input function, INPUT$, in Listings 3 and 4. It replaces INKEY$; for example, the Model III code in Listing 3 might be 10 I$ = INKEY$:IF I$ = "" THEN 10. The syntax is INPUT$(n,b), where "n" is the number of characters (no more, no less) from a file assigned to buffer "b" or from the keyboard if you don't specify a buffer. Model 4 Basic doesn't echo keyboard input to the screen.

It Takes Coordination

Microsoft altered the Model 4's PRINT@ function so you can specify screen locations as row and column coordinates; the syntax is PRINT@(r,c). This is an easier way than that Model III Basic uses to set up display positions.

You can still specify PRINT@ locations as an offset from the start of video memory, which has an advantage: You can store calculated or premapped cursor locations in single-integer variables (with a value of zero to 1919) instead of two-integer variables needed to store row/column designators.

New also is the ROW(x) function,

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Program Listing 5. Error-handling routine.

```
10 WARN1$="<ENTER>":WARN2$=SPACE$(7)
60000 PRINT@(23,5),"INVALID Entry!!! - Hit ";
60010 CSR=ROW(X)*80+POS(X)-1
60020 PRINT "<ENTER> to continue... ";
60030 WHILE INKEY$<>CHR$(13)
60040 WHILE TMR<>VAL(RIGHT$(TIME$,1))
60050 TMR=VAL(RIGHT$(TIME$,1))
60060 SWAP WARN1$,WARN2$
60070 PRINT@CSR,WARN1$;
60080 SOUND 3,0
60090 WEND
60100 WEND:RETURN
```

End

Program Listing 6. Clock display and CAPS lock toggle.

```
10 CLS:GOSUB 60000
20 CAP.PTR%=10*256+2^5
22 'flags+10, bit 5 = CAPS lock
30 CLK.PTR%=21*256+2^4
32 'flags+21, bit 4 = Clock ON/OFF
40 DEF FNTGL%(X%)=PEEK(FLAGS%+X%56) XOR (X% MOD 256)
100 INPUT "Type your name ";N$
110 POKE (FLAGS%+CLK.PTR%56),FNTGL%(CLK.PTR%)
120 PRINT "Clock ON"
130 POKE (FLAGS%+CAP.PTR%56),FNTGL%(CAP.PTR%)
140 INPUT "Type it again ";N$
150 POKE (FLAGS%+CLK.PTR%56),FNTGL%(CLK.PTR%)
200 PRINT "Clock OFF":END
60000 FOR J%=1 TO 6:READ USER%(J%):NEXT
60010 FLAGS%=0:GET.FLG%=VARPTR(USER%(1))
60020 CALL GET.FLG% (FLAGS%):RETURN
60100 DATA 16101,-4251,-6659,-7743,9073,-13968
```

End

which returns the current cursor row number (zero to 23). You can use Row with the familiar POS(x) to get the cursor's row/column coordinates. A slight problem with POS is that it returns a value of 1–80; PRINT@ positions are specified as zero to 79.

Many Basic commands (such as Row and POS) require a dummy argument; for example, the "x" in the above examples. This satisfies Basic's function interpretation routine's syntax requirements. They are place-holders, preventing the parsing routine from labeling a function with no argument as a syntax error.

Swap (SWAP v1,v2) is a useful new command that, as it's name implies, interchanges the values of its arguments. The parameters must be variables, not constants, and must be identical types. An obvious use of Swap would be in a Basic sort routine. You can also use it to toggle a string or numeric variable between two possible values, as you'll see in an example to follow.

Internal string manipulation has been greatly streamlined in the new Basic through the use of dynamic string memory allocation and improved assignment techniques. No longer do you need to reserve string storage space with the Clear statement, which is now modified to set Basic's top-of-memory pointer. You can use a second Clear argument to set Basic's stack size. You would need this only in extraordinary program situations. Clear alone resets all variables as it does in Model III Basic.

Microsoft modified FRE(x$) to return the amount of free memory, the same as MEM does. With dynamic string space allocation, its old Model III function becomes meaningless in Model 4 Basic. The Model 4 manual states that you can have a dummy parameter of any type and that executing this function forces garbage collection and returns the amount of free memory. In fact, garbage collection occurs only if you use a string variable as the dummy.

Frequent use of FRE can minimize the delays of garbage collection by reducing the number of orphaned strings at each purge. You'll notice the FRE delay least if you use it immediately after displaying a screen of data, or just after an input prompt when the user is busy reading or formulating a response.

Restore(n) has been modified to let you reuse the data in a specific line of code. This is an improvement over previous Basics, in which Restore reestablishes access to all data.

Sound (SOUND t,d) is a new Model 4 Basic command. The function generates a tone of frequency "t" and duration "d" via the 4's internal speaker. This is a tone more suited to games and as an alarm than for music.

The Model 4 interpreter offers a new output command, WRITE# (WRITE# b,data. . .), to output to the file associated with buffer "b" the data contained in a data list, properly delimited with commas and quotes as sequential files require. If you don't specify "#" and buffer number "b," Write sends data to the screen, a useful debugging aid, since you'll see even a string of spaces (or leading/trailing spaces).

Microsoft replaced the Model III TIME$ function with DATE$ and TIME$. You thus no longer need the cumbersome LEFT$(TIME$,8) and RIGHT$(TIME$,8) commands to separate the date and time.

Other "convenience" commands include Option Base and SPACE$. The first lets you specify either subscript zero or 1 to describe the first element of an array. By specifying a base option of 1, the element subscripts of an array will correspond to the record numbers of a direct-access disk file.

SPACE$ (SPACE$(n)) builds a string of "n" spaces in the same manner as STRING$(n,32). A related command, SPC(n), is similar to TAB(n) except that it moves the print position to the current column plus "n" spaces. Tab moves to absolute column "n."

You can convert numeric values to hexadecimal (base 16) or octal (base 8) string representations with HEX$(n) and OCT$(n). If you program in Assembly language, you'll appreciate the HEX$ function; otherwise, you might never need it.

Program Listing 5 is a simple error-message-handling routine using some of the new commands and functions discussed.

The program enters the subroutine at line 60000. The subroutine prints the first portion of the error message and then calculates the cursor position for the blinking message (line 60010). By repeatedly setting the variable TMR equal to the seconds counter of TIME$, the While..Wend loop toggles WARN1$ and WARN2$ to blink the message once per second. SOUND 3,0 in line 60080 alerts the operator.

What Else Is New?

Model 4 Basic incorporates a new method of interfacing to machine-language routines. Unlike the USRn statement of the Model III, the Call statement (CALL a(v1,v2,v3,. . .)) lets you pass more

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than one parameter to (and from) user routines. When the program enters your Assembly-language subroutine at address "a," the HL and DE registers will hold the VARPTR addresses of variables used as parameters 1 and 2 in the Call statement. If you specified only three parameters, BC holds the VARPTR value for parameter 3. If you're passing more than three values, BC points to a table of VARPTRs for the remaining parameters. If your machine-language routine saves these pointers, you can pass data back to Basic by stuffing the proper information into the pointers.

An example of multiple value passing could easily take all the space I have here, but I'll use Call in an example later to receive an integer value.

The old Renumber command Name now renames files from Basic. The RENUM command renumbers Basic source code. All line references in GOTOs and GOSUBs are renumbered, but you can't renumber a block of lines in the middle of a program.

"WIDTH [LPRINT] n" lets you set the line width of either the video display or printer output (if you use the LPRINT option). I can't see a use for the latter; the forms filter does this and more. Nor can I see much use for its video function. But it's there, so I thought I'd mention it.

Another new command, Wait, suspends program execution until Basic inputs a specific bit pattern from whichever one of the Z80's 256 input ports you specify. This is a convenience command; it does nothing that you can't do with a While. . .Wend loop and the INP(n) function. I took a quick look at the Model 4's port assignments and can't see any use for this in a standard system.

LPOS(x) returns the column number coinciding with where Basic expects your printer will print the next character. I say "expects," because Basic has counted each character sent to the printer since the last carriage return to arrive at this value. Many characters output to a printer directly control print head movement, but Basic counts each as a single character. Keep this in mind if you use this function.

The ERRS$ function returns a string containing the error number and a descriptive message.

You won't find the Level II and Model III CMD functions in Model 4 Basic, but you can duplicate most of them fairly easily. I've already mentioned the sort routine published in *80 Micro* to take the place of CMD"O". CMD"X", the cross reference function, is not available and sorely missed by some programmers. *(80 Micro has a Model 4 cross-reference program slated for publication later this year.—Eds.)*

Model 4 Basic has a function, ERRS$, that is similar to CMD"E". It returns a string containing the error number and a descriptive message. TRSDOS's error messages are often more informative than Basic's; for instance, should you attempt to access a drive without a disk, Basic gives you a "Bad file name" error, while the DOS gives you "Drive not ready."

You can duplicate CMD"R" and CMD"T"'s control of the clock display with SYSTEM "TIME(CLOCK=Y)". Unfortunately, the DOS Time command displays the time and a carriage return at the last cursor position, marring the display. The routine in Program Listing 6 overcomes this problem by loading and executing a 12-byte machine-language subroutine that puts the address of the DOS's system flag's storage area into the variable FLAGS%. From this base address, the 4 calculates two pointers, one to the keyboard flag byte (CAP.PTR%) and another to the display status byte (CLK.PTR%). By POKEing values obtained from a user functon FNTGL%, you can toggle both the clock display and the CAPS lock on or off.

This routine also introduces two new arithmetic operators and one new logical operator. MOD provides the modulus function; X MOD Y returns the remainder of X divided by Y.

The backslash character provides an integer division function; that is, X\Y yields the integer portion of the quotient.

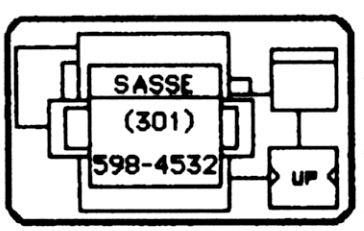
In line 20, the integer variable CAP.PTR% has the offset from FLAGS% assigned to the high byte (10*256), and the bit number of the CAPS flag assigned to its low byte. The user function FNTGL% decodes this integer variable into the offset and bit number using the integer division and MOD operators.

The exclusive OR logical (XOR), a new logical operator, also appears in the user function, and toggles the flag bit.

Writing about Model 4 Basic's graphics commands is simple—there aren't any. Model 4 Basic doesn't include the Model III's Set, Reset, and Point commands. However, the Model 4 character generator can produce the same (modified somewhat for the new screen format) 64 graphics characters as the earlier machines, so by carefully building strings with CHR$(n) you can create graphics displays.

You can add Set, Reset, and Point with Mark Goodwin's machine-language subroutines published in the April 1984 issue of *80 Micro* ("Restored Art," p. 157) or

Circle 350 on Reader Service card.



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with Alan Smith's Basic subroutine in this issue ("Upgraded Graphics," p. 76). If you're really into graphics, look up "Clear-Cut Trends" in the April 1985 issue (p. 40). It contains programs for the optional high-resolution video board with 640- by 240-pixel resolution.

Model 4 Basic includes many internal improvements to reduce source code length and increase execution speed. One such technique is a better way of storing numeric constants. When you type in a program, the computer converts numeric constants to the same packed format in which it stores variables as it encodes each line. To see what I mean, type in the following:

```
10 A = 123456
20 B = 1234567890123456
```

Now list it. See the "!" and "#" characters that the interpreter appended to your constants? A memory dump of this code shows that Basic stores the first constant in 5-byte single-precision format (1 byte less than the same code saved in ASCII) and that it stores the second value as an 8-byte double-precision value (saving 8 bytes). Since Basic doesn't have to decode constants each time the executing program meets one, the program runs faster.

Conclusions

Model 4 Basic is a big improvement over the earlier versions. The chain capability, in conjunction with Erase and the improved Restore statement, means that your programs' lengths are limited only by disk space. While. . .Wend removes the confusion of GOTO statements, and new techniques of dynamic string allocation and constant storage improve overall execution speed.

If you're an old Model I or III programmer who hasn't explored Model 4 Basic yet, get cracking—you'll soon give up your old ways. ■

Related Articles

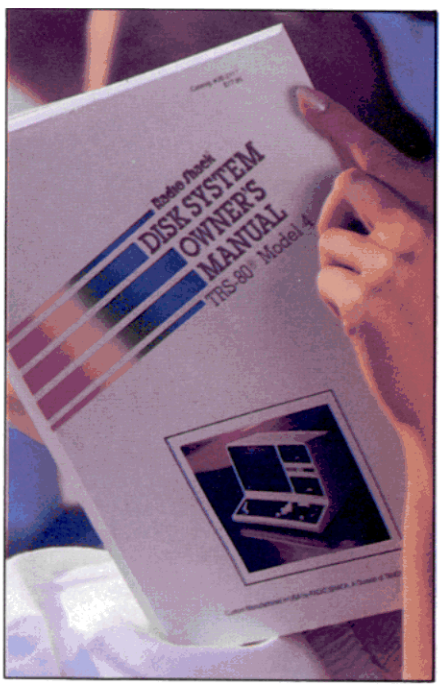
Goodwin, Mark D. "Redevelopment Program." April 1984, p. 96. Program to convert Model III Basic programs to the Model 4.

Goodwin, Mark D. "Restored Art." April 1984, p. 157. Program to add Set, Reset, and Point to Model 4 Basic.

Graebner, Bruce A. and Jeffrey P. "Clear-Cut Trends." April 1985, p. 40. Business graphs for the III/4 hi-res board.

Smith, Alan D. "A Sort Story." March 1985, p. 70. A fast string sort for the Model 4.

Address correspondence to Clifford I. Knight, 6 Janebar Circle, P.O. Box 253, Manomet, MA 02345.



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Manufacturer: Simutek Computer Products Inc., 4897 E. Speedway, Tucson, AZ 85712.

Machine-language programming isn't for everyone, but everyone wants the speed of machine language. This Basic compiler converts Basic files to /CMD files.

Tandy 1000

EZ-Dos-It $199.95 from Hammer Computer Systems, 700 Larkspur Landing Circle, Suite 285, Larkspur, CA 94939, 415-461-7633.
Manufacturer: Hammer Computer Products.

This program runs up to eight Model 1000 files concurrently without requiring a hardware modification. Using the control and function keys, you can simultaneously run all programs that can fit into the 1000's memory.

Flight Simulator $34 from Applied Computer Products, 1633 Republic Road, Huntington Valley, PA 19006, 215-322-6500.
Manufacturer: Microsoft, 10700 Northrup Way, Bellevue, WA 98004.

Microsoft's classic has to be a must for any MS-DOS library.

Gato $25 from Conroy-LaPointe, 12060 S.W. Garden Place, Portland, OR 97223, 800-547-1289.
Manufacturer: Spectrum Holobyte Inc., 1494 Greenbriar Blvd., Boulder, CO 80303.

This real-time submarine simulator is a challenge for players of any ability.

Microsoft Basic Compiler $229 from CompuClassics, 6934 Canby St., Suite 104, Reseda, CA 91335, 800-328-4473.
Manufacturer: Microsoft (see address above).

Microsoft's compiler speeds up those normally slow-running GW-Basic programs.

The Norton Utilities $48 from Computers Direct, 6232 Oakton St., Morton Grove, IL 60053, 800-848-0888.
Manufacturer: Peter Norton, 2210 Wilshire Blvd., Santa Monica, CA 90403.

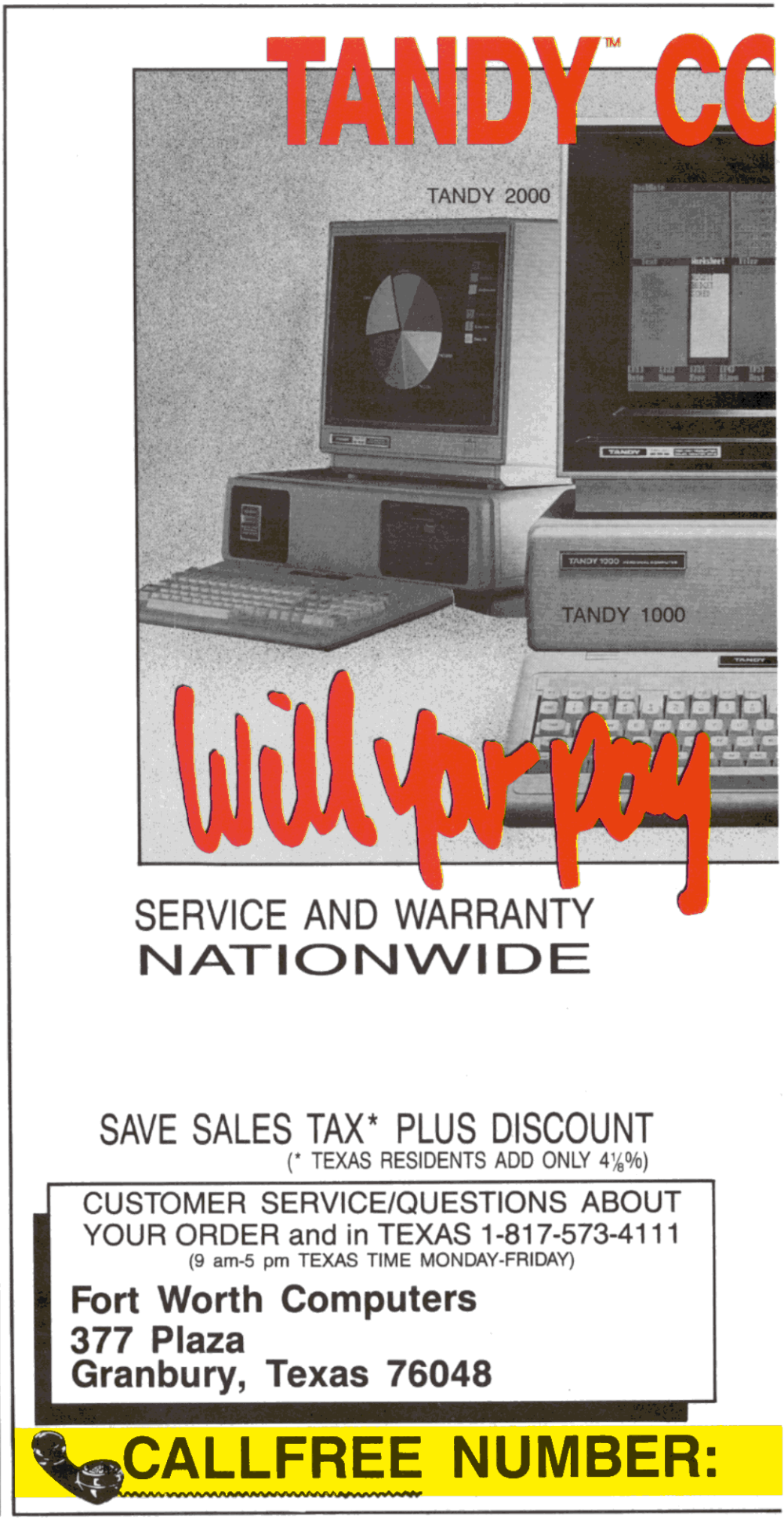
Peter Norton's disk utility package is the Super U of the MS-DOS world. (At this writing, Powersoft was about to introduce its MS-DOS version of Super U.)

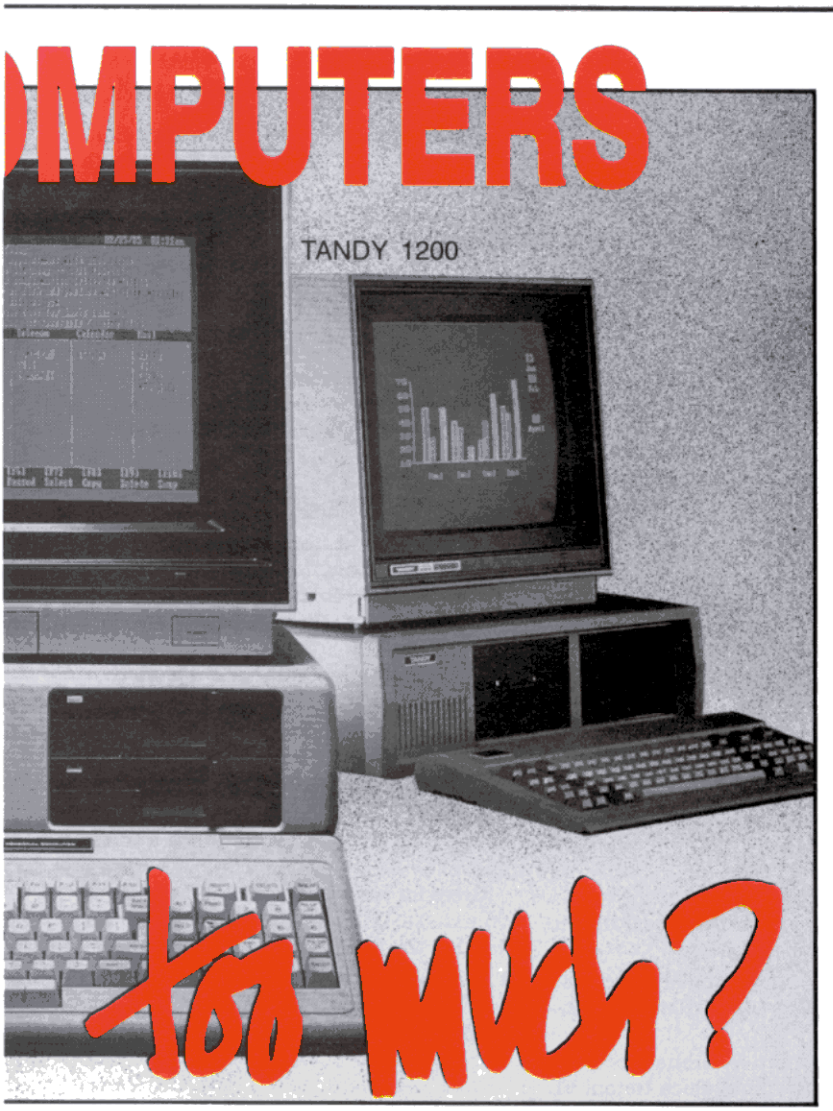
Sidekick $30 from PC Connection, 6 Mill St., Marlow, NH 03456, 800-243-8088.
Manufacturer: Borland International, 4113 Scotts Valley Drive, Scotts Valley, CA 95066.

A concurrent desktop utility. With only a few keystrokes, you can display all the information you need to keep things organized: a calculator, a notepad, an ASCII table, and more.

Supercalc III $219 from CompuClassics (see address above).
Manufacturer: Sorcim/IUS Micro Software, 2195 Fortune Drive, San Jose, CA 95131.

Supercalc III provides a better data base than DeskMate, along with the graphics I





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need to present data base or spreadsheet information. The price may be steep, but it's a program with applications beyond those I can list here.

ThinkTank $105 from Conroy-LaPointe (see address above).
Manufacturer: Living Videotext Inc., 1000 Elwell Court, Suite 232, Palo Alto, CA 94303.

An idea processor for writers who need to outline their thoughts.

Volkswriter $105 from Conroy-LaPointe (see address above).
Manufacturer: Life Tree Inc., 411 Pacific St., Monterey, CA 93940.

I found this popular word processor easy to use and flexible in handling printers and text-formatting commands.

DeskMate Free with a Tandy 1000.
Manufacturer: Tandy/Radio Shack (see address above).

I didn't include a terminal program in my list because DeskMate's is sufficient for me. The other utilities in the program no longer meet my needs, so I found more powerful programs.

Rowell's Choices

It was easier for me to come up with the Tandy 1000 list; I'm most familiar with MS-DOS computers. I'm a little less secure about my Model 4 choices.

The order of listing has some correlation with a program's importance for me. My listed prices usually don't include shipping, but I took shipping charges, or lack thereof, into account when comparison shopping.

I don't need a spreadsheet, so I didn't pick one for the Model 4. With the 1000, I can use DeskMate's. I suppose I could have fallen back on DeskMate for other types of software that I use rarely.

Once I made my Model 4 choices, it was easy to stay under $1,000. There's plenty of room for a few luxury items if you spend wisely. I found 16 Model 4 programs for $998. For the Tandy 1000, I got 12 programs for $981 (good luck finding an MS-DOS software product for the remaining $19). With the exception of the Borland International products and a few others, MS-DOS programs are pricier. I didn't have enough to buy a Basic compiler, for instance.

Model 4

Super Utility 4/4P $70 from Montezuma Micro (see address above).
Manufacturer: Powersoft (see address above).

This disk utility is, in a word, indispensable.

Scripsit $85 from Montezuma Micro (see address above).
Manufacturer: Tandy/Radio Shack (see address above).

The word processor I'm used to. A word processor is important to me, but I don't need lots of features. I'm going to soup up this one with the two add-ons below.

Powerscript $35 from DiskCount Data, 2701-C W. 15th St., Suite 612, Plano, TX 75075, 214-680-8268.
Manufacturer: Powersoft (see address above).

An enhancement package adding all the features of SuperScripsit except proportional spacing and a couple of others.

Powerdriver $30 from Powersoft (see address above).
Manufacturer: Powersoft.

In case I want to use a non-Tandy printer for fancy stuff.

Electric Webster $90 from Cornucopia Software, P.O. Box 6111, Albany, CA 94706, 415-524-8098.
Manufacturer: Cornucopia Software.

I've just discovered that spelling checkers are worth the money.

Zork II $40 from JMG Software International (see address above).
Manufacturer: Infocom Inc. (see address above).

For adventure games, I like Infocom.

M-ZAL Macro Assembler $80 from JMG Software International (see address above).
Manufacturer: Computer Applications Unlimited, P.O. Box 214, Rye, NY 10580.

I'm just getting started in machine-language programming. Hardin Brothers likes this one and the features seem right.

TRSDOS 1.3 $12 from Montezuma Micro (see address above).
Manufacturer: Tandy/Radio Shack (see address above).

A small price to pay for the option of running Model III software.

ZBasic 3.0 Basic Compiler $80 from JMG Software International (see address above).
Manufacturer: Simutek Computer Products Inc. (see address above).

For me, Z's overall features outweigh its lack of a chaining capability.

The Producer $200 from Producer Software, Box 1245, Arlington, TX 76004.
Manufacturer: Producer Software.

I don't need a data base, but I like playing with data bases anyway. It would be fun to design my own with this recommended program writer. The enjoyment would justify the program's high price for me.

Hypercross $50 from Hypersoft, P.O. Box 5115, Raleigh, NC 27609, 919-847-4779, 6–11 p.m.
Manufacturer: Hypersoft.

To transfer files from the Model III/4 to MS-DOS computers.

MTerm $60 from Design Software, Box 42847, Las Vegas, NV 89104, 800-622-4070.
Manufacturer: Micro-Systems Software Inc., 4301-18 Oak Circle, Boca Raton, FL 33431.

I don't telecommunicate much. I'm more likely to transfer files via a null modem. This terminal program looks as if it'll do the job at a reasonable price.

Disk Drive Analyzer $26 from Montezuma Micro (see address above).
Manufacturer: Tandy/Radio Shack (see address above).

Important with a Radio Shack computer, but not that important. As the ad says, "Why pay more?"

LS-Utility Disk $50 from Logical Systems Inc., 8970 N. 55th St., P.O. Box 23956, Milwaukee, WI 52332, 800-248-3535.
Manufacturer: Logical Systems.

A good bunch of utilities that Super U doesn't provide.

Double Duty $60 from Montezuma Micro (see address above).
Manufacturer: Tandy/Radio Shack (see address above).

This is a luxury, a gee-whiz program that's really handy from time to time. It does require a 128K machine.

Voyage of the Valkyrie $30 from DiskCount Data (see address above).
Manufacturer: Not available.

I had $32 of my $1,000 left and went for something frivolous.

Tandy 1000

Perfect Writer (with speller) $199 from Conroy-LaPointe Inc. (see address above).
Manufacturer: Thorn EMI Computer Software Inc., 3187 C Airway Ave., Costa Mesa, CA 92626.

This word processor has lots of features for the price, is easy to use, and has a speller. Doesn't tell you where you are in the document, though.

SideKick $30 from PC Connection (see address above).
Manufacturer: Borland International (see address above).

The desktop program of choice if you're a programmer, since it has an ASCII table and a calculator that works in hexadecimal and binary formats.

ThinkTank $99 from Northeastern Software, 88 Riders Lane, Stratford, CT 06497, 203-375-3860.
Manufacturer: Living Videotext Inc. (see address above).

An outlining program, and a good writer's crutch.

The Norton Utilities 3.0 $55 from Business Computers of Peterborough, NH, School St., Peterborough, NH 03458, 603-924-9406.
Manufacturer: Peter Norton (see address above).

Great for recovering data and exploring your disks. (There's a Super Utility for the 1000 in the works.)

Flight Simulator $32 from Northeastern Software (see address above).
Manufacturer: Microsoft (see address above).

A classic. More than a game, it shows what the 8088 can do.

MASM $65 from MC-P Applications, 1630 Oakland Road, Suite A114, San Jose, CA 95131, 408-293-3360.
Manufacturer: Microsoft (see address above).

The standard assembler for PC compatibles.

dBase II $249 from Northeastern Software (see address above).
Manufacturer: Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, CA 90320.

The well-known relational data base. Not easy to use, but powerful; I want to experiment with it.

Copy II PC $25 from Telasoft, 2222 E. Indian School Road, Phoenix, AZ 85016.
Manufacturer: Central Point Software Inc., 9700 S.W. Capitol Highway 100, Portland, OR 97219.

I promise I won't misuse it.

Turbo Pascal $30 from PC Connection (see address above).
Manufacturer: Borland International (see address above).
The cheap way to learn Pascal.

SmartCom II $89 from PC Connection (see address above).
Manufacturer: Hayes Microcomputer Products Inc., 5923 Peachtree Industrial Blvd., Norcross, GA 30092.

A reasonably priced terminal program.

Sorcerer $29 from PC Connection (see address above).
Manufacturer: Infocom Inc. (see address above).

One of my favorite adventure games. I got stuck in this one long ago.

Prokey 3.0 $79 from Warehouse Data Products, 2701 W. Glendale Ave., Suite 6, Phoenix AZ 85021, 602-246-2222.
Manufacturer: RoseSoft, 4710 University Way N.E., Seattle, WA 98105.

I haven't yet tried this keyboard macro definer on the 1000. It might help solve keyboard compatibility problems with other PC software. ■

Bradford N. Dixon and Dave Rowell are on the 80 Micro *staff.*

Note: The software prices quoted here were current in April 1985, and may have changed since then.

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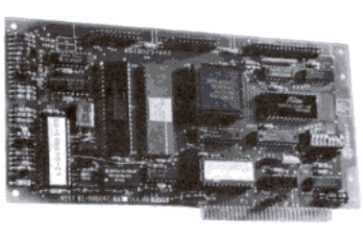

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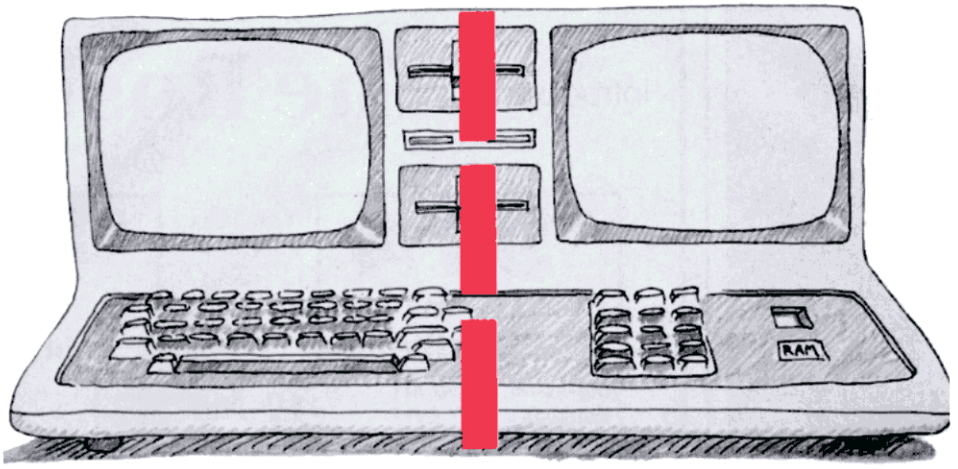

The Great Divide

by E. Cameron Snyder

Partition your 128K Model 4 so you can switch back and forth between two programs in Model III mode.

If you own a 128K Model 4 or 4P, chances are you've heard about Radio Shack's DoubleDuty utility, which splits your computer into independent partitions so you can switch between two Model 4 programs at will. But DoubleDuty works only with TRSDOS 6.X. Why waste your computer's extra memory and bank-switching feature when you run programs in Model III mode?

Times2 gives you DoubleDuty's capabilities for Model III programs by setting up two partitions operating under LDOS 5.1.X (see the Program Listing). You can load two Model III applications and switch back and forth between them, returning to each program just as you left it.

Even if you don't need double program operation, how many times have you been in the middle of a job and needed information from another program, or a simple directory listing. With Times2 installed, you can get that information and return with your job intact.

What You Get

Times2 is an interrupt routine that creates and switches between two partitions that function like two independent Model 4's in Model III mode. Unlike DoubleDuty, Times2 doesn't provide a third partition for library commands. But Times2's partition swapping is about 10 times faster than DoubleDuty's. Also, with my program, you only need a system disk available for the first swap or for a soft reset (described below).

Times2 uses 187 bytes of high memory and is nondestructive. It duplicates any routines resident in upper memory and above HIGH$ when you install it and makes those routines active in the second partition as well as the first. This includes filters, routers, drivers, Debug or Clock status indicators, and the like. Any routines you activate after you install Times2 will work only in the partition in which you activate them.

The program duplicates active job control language (JCL) routines (those that call Times2) to the second partition. Therefore, when you enter the second partition, JCL takes control of your computer at the point right after Times2's invocation, even if the first partition has already completed the JCL operation. While you can use this creatively, it can also be a hindrance, in which case I suggest you invoke Times2 manually or use the command AUTO TIMES2.

Times2 has the added feature of speeding up the 4/4P's Model III-mode clock to run at 4 MHz. On the Model 4P, Times2 slows down the cursor-flash and key-repeat rates so you won't get dizzy and fall off your chair. It also compensates the real-time clock counter so that TIME$ doesn't run at double speed.

I couldn't compensate the cursor-flash rate and real-time clock counter on the Model 4; they're maintained in ROM. If this bothers you, omit the fast clock option when you install Times2 (see below).

Don't forget that the clock is specific to the partition it's in. When you exit a partition, its clock stops until you reenter the partition.

Swap and Go

To install Times2, assemble the source code in the Listing and save it to disk. Type in TIMES2 at LDOS ready and press the enter key. If you want the clock speed doubled, hold down the F key immediately after pressing the enter key. When you see the message "Release the <F> key," you know that you invoked the fast clock speed. Oh, and do release the F key when prompted.

Now put a Model III program disk in drive zero (and another in drive 1 if necessary) and load your program as usual. To switch partitions, press the control and right-shift keys simultaneously, then release them. This is a toggle sequence; the same keys switch you back.

For applications that require a reset to exit them, Times2 has a soft reset feature so you don't have to press the computer's reset button; that way, you won't lose Times2 and the program in the other partition. You'll also find this feature useful in recovering from system crashes or as an easy out to the LDOS ready prompt.

To use the soft reset, hold down the control and right-shift keys while you press the left-shift key and release it. Remember to put a system disk in drive zero before you invoke a soft reset.

Times2 provides no special key sequence to disable itself. For that, you'll have to press the reset button.

Dos and Don'ts

Times2's installation will abort if you already have the program resident and active, if another application has already intercepted and changed the DOS exit interrupt vector, or if installation would lower HIGH$ to below E000 hexadecimal (hex). Times2 can't duplicate more than 4K of high-memory routines to the second partition.

When one or a combination of these three conditions exists, Times2 generates an error message to let you know that it aborted its installation. If the second or third condition is true, you'll have to press the reset button and install the offending routines after you activate Times2. Remember, they're active only in the partition in which you install them.

Applications that don't respect HIGH$ will destroy Times2. If an application disables interrupts, none of the key sequences described will do anything. In other words, Times2 won't work, since it's interrupt-driven. I think such applications are few, however. The only program I own that disables interrupts for an extended period of time is one that plays music, and who wants to switch partitions in the middle of a song, anyway?

If an application that requires a reset to exit scrambles the resident operating system beyond recognition, Times2 may be rendered helpless. In such a case, try a soft reset and see what happens.

I'd caution against swapping partitions in the middle of disk accesses. Although I've done it successfully, I haven't tried it enough to ensure that it's safe. Programs usually disable interrupts during critical moments, preventing you from swapping, but keep the warning in mind.

I've found no problem with having the same file open in both partitions, but they've been relative files with fixed lengths. Obviously, if you're working with a file and you switch partitions, change the file's parameters, and switch back again, you could have a problem.

You can switch partitions during a printing job. When you switch back, the printer starts up where it left off. Don't send any output to the printer when you've left a printing job unfinished, though, unless you want mixed job output.

Switching during communications should be no problem as long as you don't switch while receiving data. Times2 doesn't send a stop-sending signal to the host, so you'll lose data. If your modem doesn't maintain the carrier signal without your software active, you may get disconnected, but that should be rare.

Don't try to SYSGEN Times2. You have to install it, because the program adjusts to its environment with the help of a loader, which you can't SYSGEN.

Times2 uses no interrupt slots. It intercepts the DOS exit from ROM, so active interrupt routines will be unaffected.

The program uses the second page of the video RAM, so avoid homebrew applications that use this area. You'll destroy screen information, and when you return to that partition, the screen won't look anything like the one you left.

Except for the special conditions outlined above, you can switch partitions in the middle of any input/output.

Program Structure

This section provides a general step-through to aid in interpreting and understanding Times2's source code. If you're not interested in the nuts and bolts of the program's operation, you can skip the section with impunity.

Times2 has four areas of operation. To minimize confusion, I labeled the source code with the same descriptive terms I'll use here.

I'll describe what each area accomplishes, not how it does so. Those who want more detail should study the com-

LOAD 80

System Requirements

Model 4/4P
Model III mode
128K RAM
LDOS 5.1.X
Assembly language
Editor/assembler

Illustration by Chris Demarest

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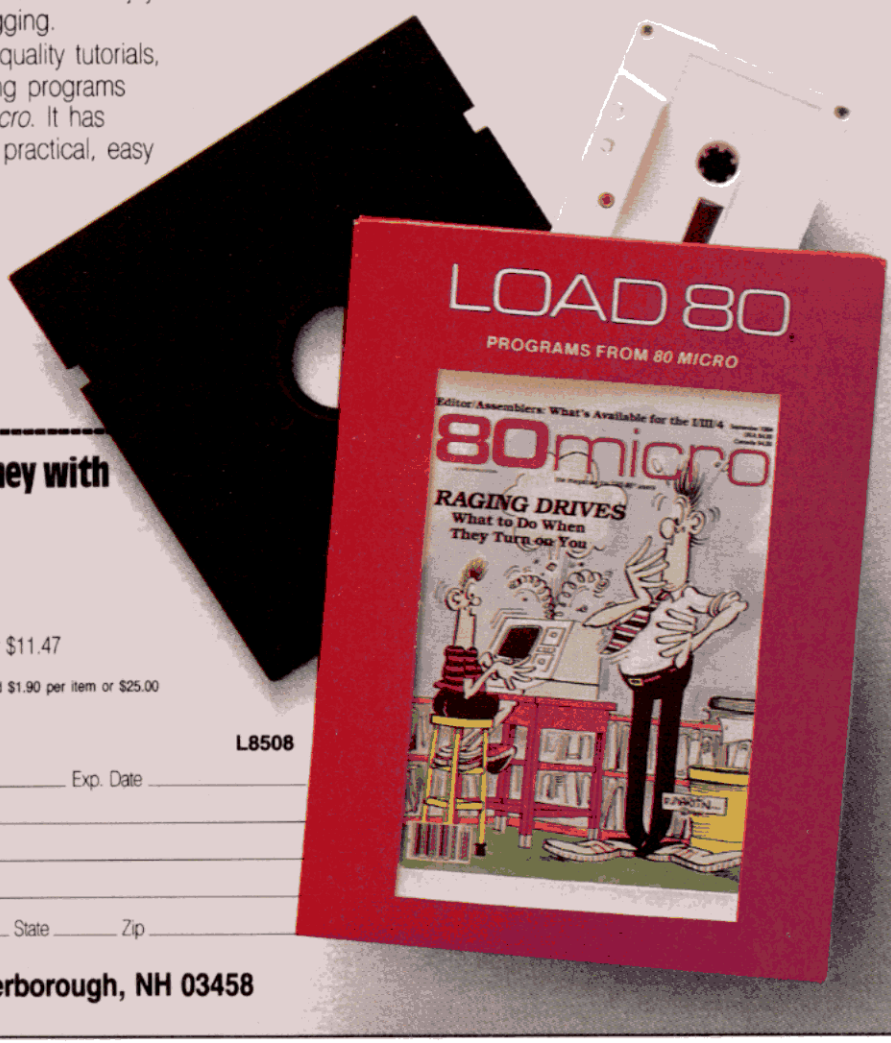

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mented source code in conjunction with the *Model 4 Technical Reference Manual*'s hardware section.

Part 1, the loader, is the program's largest and most complex part. It checks the environment in which parts 2, 3, and 4 must operate and adjusts them accordingly. It finds where in high memory they must go to be out of the way.

The loader duplicates Times2 and any other high-memory-resident routines to what becomes the second partitions's upper half. It duplicates the operating system and all lower-memory functions into what becomes the second partitions's lower half. Finally, the loader puts part 2's execution address into the DOS exit vector for interrupts.

Part 2 is serviced by the real time clock interrupt. It checks the keyboard to see if you're switching partitions. If not, it passes control to the system interrupt routine, which flashes the cursor or checks for type-ahead characters and the like.

If the routine detects a switching command, it puts part 3's execution address on the stack and passes control to the system interrupt routine. This way, when the system interrupt routine is finished and executes its return from interrupt, control automatically returns to part 3, not to the address where the interrupt occurred.

Program Listing. Times2's source code.

```
00090 ;       TIMES2/CMD Written by E Cameron Snyder (c)1985
00100 ;  Splits Model 4 running Model 3 mode into 2 partitions.
00110 ;
00120 ;
00130 ;
00140         ;FIRST PART--LOADER
00150
00160
00170         ORG     5200H
00180 BEGIN   CALL    01C9H          ;CLEAR SCREEN
00190         LD      HL,3D00H
00200         LD      (4020H),HL
00210         LD      HL,MESS2       ;DISPLAY SCREEN HEADER
00220         LD      DE,3C05H
00230         LD      BC,53
00240         LDIR
00250         LD      HL,(4013H)     ;GET INT VECTOR
00260         LD      A,44H
00270         CP      H              ;CHECK IF TIMES2 RESIDENT
00280         JR      Z,CONT
00290 ERR     LD      HL,MESS3
00300         LD      DE,3C00H       ;IF SO DISPLAY ERROR
00310         LD      BC,86
00320         LDIR
00330         JP      EXIT           ;AND EXIT
00340 CONT    DI
00350         LD      HL,4210H       ;GET OPTIONS IMAGE
00360         LD      A,(HL)
00370         LD      (JSTPSD),A     ;SAVE THEM IN TIMES2
00380         LD      A,(3801H)
00390         CP      64             ;CHECK FOR <F> KEY
00400         JR      NZ,CONT2
00410         SET     6,(HL)
00420         LD      A,(HL)         ;ALTER OPTIONS IF <F>
00430         LD      (JSTPSD),A     ;SAVE THEM IN TIMES2
00440         OUT     (0ECH),A       ;ACTIVATE NEW OPTION
00450         LD      A,1            ;MAKE ROM
00460         OUT     (84H),A        ;IMAGE ADDRESSABLE
00470         LD      A,0CH
00480         LD      (3542H),A      ;INCREASE COUNTDOWN
00490         LD      A,3CH          ;TIMER LOCATIONS
00500         LD      (355DH),A      ;IN ROM
00510         LD      HL,MESS4
00520         LD      DE,3CD4H       ;TELL USER TO RELEASE
00530         LD      BC,19
00540         LDIR                   ;<F> KEY
00550 LOOP4   LD      A,(3801H)
00560         CP      0              ;DONT
00570         JR      NZ,LOOP4       ;CONTINUE UNTIL RELEASED
00580         LD      A,20H
00590         LD      HL,3CD4H
00600         LD      B,19           ;ERASE MESSAGE
00610 LOOP5   LD      (HL),A
00620         INC     HL
00630         DJNZ    LOOP5
00640 CONT2   LD      A,2            ;CHANGE MEMORY ADDRESS
00650         OUT     (84H),A        ;SCHEME...MOVE VIDEO &
00660         LD      B,4            ;KYBD ADDRESSES TO HIGH
00670         LD      HL,0F800H      ;MEM & CLEAR WHAT WILL
00680         LD      A,20H          ;BE PARTITION 2'S SCREEN
00690 LOOP6   PUSH    BC
00700         LD      B,0
00710 CLEAR   LD      (HL),A
00720         INC     HL
00730         DJNZ    CLEAR
00740         POP     BC
00750         DJNZ    LOOP6
00760         LD      HL,MESS        ;PUT PARTITION 2 HEADER
00770         LD      DE,0F800H      ;INTO PAGE 2 VIDEO
00780         LD      BC,23
00790         LDIR
00800         XOR     A
00810         OUT     (84H),A        ;RESTORE ADDRESS SCHEME
00820         LD      HL,402DH
00830         PUSH    HL
00840         LD      HL,(4411H)     ;GET HIGH$ & SAVE
00850         PUSH    HL             ;FOR NEXT CALCULATION
```

Listing continued

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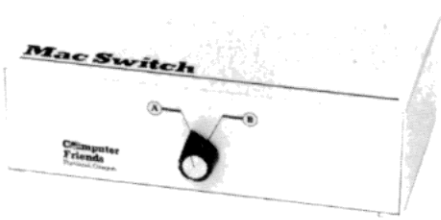

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Part 3 is the doorway or portal through which you pass to get to the other partition. It has two halves, one for leaving a partition and one for entering a partition. The routine's first half saves the address on top of the stack; this is the restart address, where the interrupt occurred and where the system should restart on reentry to the partition. Then, the first half saves all the registers so the second half can restore them on reentry, and switches partitions.

On entry to a partition, part 3's second half relocates part 4 to a safe area of lower RAM and passes control to it.

Part 4 does nothing more than save the exiting partition's screen and recover the entering partition's screen. It then returns control to part 3's second half, which recovers the reentry address from the stack, restores all the registers, and returns to where the interrupt occurred before the switch.

Modifications

If you like Times2's clock speed-up, but find it makes a game or other timing-critical program run too fast, you can reset bit 6 at location 4210 hex, then output the 4210 hex byte to port EC hex. The following four statements, inserted at the beginning of a Basic program, accomplish this:

```
var = PEEK(&H4210):
var = var AND 191 :
POKE &H4210,var:
OUT &HEC,var
```

You should replace "var" with some numeric variable. These statements force the partition to go slow. You'll switch speeds when you swap partitions, since Times2 remembers a partition's speed. To force the partition to go fast again, use the same four statements, substituting OR 64 for AND 191 in the second statement.

If you get tired of pressing F and prefer to invoke the speed-up automatically, apply this patch from LDOS ready:

```
PATCH TIMES2/CMD (X'5237' = 00 00)
```

Users who've upgraded to LDOS 5.1.4 don't need the F key or the above patch for the speed-up, since the operating system already provides this as a default. Also, executing CMD "SYSTEM(SLOW)" or CMD "SYSTEM(FAST)" from Basic precludes the use of the Basic statements listed above, since those commands function properly on the Model 4/4P under the new version.

The 5.1.4 version doesn't compensate the real time clock, key-repeat and cursor-flash rates on the 4P however. If your cursor is zipping along out of control or flashing you into catatonia, use the F key or apply the patch listed above and all will be well. ■

Cameron Snyder, business manager for the Sacramento Family Service Agency, uses his computer for business and pleasure. You can write to him at 7308 E. Parkway, Sacramento, CA 95823, or via CompuServe's EasyPlex mail service, ppn. 70645,1354.

Listing continued

```
00860           LD      DE,0E000H+187
00870           SBC     HL,DE           ;IS HIGH$ TOO LOW
00880           JP      C,ERR           ;IF SO GOTO ERR & EXIT
00890           POP     HL
00900           PUSH    HL
00910           LD      BC,LAST-INTHLD  ;BEGIN
00920           SBC     HL,BC
00930           INC     HL              ;CALCULATING
00940           LD      (P13+1),HL
00950           POP     HL              ;NEW
00960           PUSH    HL
00970           LD      BC,LAST-P7      ;ABSOLUTE
00980           SBC     HL,BC
00990           INC     HL              ;ADDRESSES
01000           LD      (P9+1),HL
01010           POP     HL              ;USED IN
01020           PUSH    HL
01030           LD      BC,LAST-CHG2    ;RELOCATED
01040           SBC     HL,BC
01050           INC     HL              ;ROUTINE
01060           LD      (P11+1),HL
01070           POP     HL              ;USING HIGH$ IN A FORMULA
01080           LD      BC,LAST-START
01090           LD      (STKHDR),SP     ;FOR OFFSET
01100           SBC     HL,BC
01110           LD      (4411H),HL      ;NEW MEM ADDR FOR HIGH$
01120           INC     HL
01130           PUSH    HL
01140           PUSH    HL
01150           PUSH    HL
01160           INC     HL
01170           INC     HL
01180           LD      (P1+1),HL
01190           LD      (P12+1),HL
01200           INC     HL
01210           LD      (P2+2),HL
01220           LD      (P5+2),HL
01230           LD      (P8+1),HL
01240           LD      (P10+1),HL
01250           LD      DE,14
01260           ADD     HL,DE
01270           LD      (P3+1),HL
01280           POP     HL
01290           EX      DE.HL
01300           LD      HL,(4013H)
01310           LD      (P6+1),HL
01320           LD      (4013H),DE      ;TIMES2 INTO INT VECTOR
01330           LD      (INTHLD),DE
01340           LD      HL,START        ;RELOCATE PARTS 2, 3 & 4
01350           LDIR                    ;TO HIGH MEM LOCATION
01360           LD      DE,6000H
01370           LD      HL,0FFFFH       ;MOVE HIGH MEM ROUTINES
01380           POP     BC              ;INTO BANK 0
01390           SBC     HL,BC
01400           PUSH    HL
01410           POP     BC
01420           INC     BC
01430           POP     HL
01440           PUSH    BC
01450           LDIR
01460           LD      HL,6002H
01470           LD      BC,CHG-JSTPSD
01480           ADD     HL,BC           ;CUSTOMIZE IT FOR
01490           INC     HL              ;PARTITION 2
01500           LD      (HL),60H
01510           LD      BC,CHG2-CHG
01520           ADD     HL,BC
01530           LD      (HL),32H
01540           LD      BC,CHG3-CHG2
01550           ADD     HL,BC
01560           LD      (HL),30H
01570           LD      A,30H           ;SWITCH IN BANK 3
01580           OUT     (84H),A
01590           LD      HL,6000H        ;DUPLICATE ALL HIGH MEM
01600           LD      DE,(4411H)      ;ROUTINES TO BANK 3
01610           INC     DE              ;(UPPER HALF OF PARTITON
01620           POP     BC              ;2)
01630           LDIR
01640           LD      A,20H
01650           OUT     (84H),A         ;SWITCH IN BANK 2
01660           LD      HL,0
01670           LD      DE.8000H        ;DUPLICATE BANK 0
01680           LD      BC,8000H        ;TO BANK 2 (LOWER HALF
01690           LDIR                    ;OF PARTITION 2)
01700           LD      A,30H           ;ALL DONE SWITCH BACK
01710           OUT     (84H),A
01720 EXIT      EI
01730           JP      402DH           ;AND EXIT
01740
01750
01760           ;PART TWO
01770
01780
01790 START     JR      HERE            ;JMP PAST SAVE AREA
01800 JSTPSD    DEFB    0
01810 STKHDR    DEFW    0
01820           DEFW    0               ;FOR STACK
01830           DEFW    0               ;AND REGISTERS
01840           DEFW    0
01850           DEFW    0
01860           DEFW    0
01870 BTMSTK    DEFW    0
01880 INTT      POP     AF              ;RESTORE
01890 P6        JP      0               ;AND RESUME INT TASKS
01900 HERE      PUSH    AF
```

Listing continued

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```
01910           LD      A,(3880H)       ;CHECK KYBD FOR SWITCH
01920           CP      6               ;COMMAND
01930           JR      NZ,INTT         ;NOT PRESSED, RETURN
01940           POP     AF
01950 P8        LD      (STKHDR),HL
01960 P9        LD      HL,P7           ;PRESSED SO SAVE PART
01970           PUSH    HL              ;THREE'S ADDRESS TO STACK
01980 P10       LD      HL,(STKHDR)
01990           JR      P6              ;CONTINUE W/ INT ROUTINE
02000
02010
02020           ;FIRST HALF--PART THREE
02030
02040
02050 P7        DI
02060           PUSH    AF
02070 LOOP      LD      A,(3880H)
02080           CP      7               ;SOFT RESET COMMAND?
02090           JR      Z,RESET         ;YES, GOTO IT
02100           CP      0
02110           JR      NZ,LOOP
02120           LD      A,(4210H)       ;GET OPTIONS AND
02130 P1        LD      (JSTPSD),A      ;SAVE FOR THIS PARTITION
02140           POP     AF
02150 P2        LD      (STKHDR),SP     ;SAVE STACK LOCATION
02160 P3        LD      SP,INTT         ;POINT STACK TO SAVE AREA
02170           PUSH    AF              ;SAVE REGISTERS
02180           PUSH    BC
02190           PUSH    DE
02200           PUSH    HL
02210           PUSH    IX
02220           PUSH    IY
02230 CHG       LD      A,30H
02240           OUT     (84H),A         ;SWITCH IN NEW PARTITION
02250
02260
02270           ;SECOND HALF--PART THREE
02280
02290
02300 RTN       POP     IY              ;RESTORE REGISTERS
02310           POP     IX
02320           POP     HL
02330           POP     DE
02340           POP     BC
02350           POP     AF
02360 P5        LD      SP,(STKHDR)     ;RESTORE STACK POINTER
02370           PUSH    AF
02380           PUSH    BC              ;SAVE REGISTERS USED
02390           PUSH    HL              ;BY PART FOUR
02400           PUSH    DE
02410           LD      DE,4300H
02420 P11       LD      HL,CHG2         ;RELOCATE PART FOUR
02430           LD      BC,MESS-CHG2
02440           LDIR
02450           CALL    4300H           ;CALL PART FOUR
02460 P12       LD      A,(JSTPSD)      ;GET OPTIONS FOR THIS
02470           LD      (4210H),A       ;PARTITION AND RESTORE
02480           OUT     (0ECH),A
02490           POP     DE
02500           POP     HL
02510           POP     BC
02520           POP     AF
02530           EI
02540           RET                     ;CONTINUE WITH PROCESSING
02550 RESET     LD      A,(3880H)
02560           CP      0
02570           JR      NZ,RESET
02580           POP     AF
02590 P13       LD      HL,(INTHLD)     ;SOFT RESET SECTION
02600           LD      (4013H),HL
02610           EI
02620           JP      402DH
02630
02640
02650           ;PART FOUR
02660
02670
02680 CHG2      LD      A,62H           ;CHG MEMORY SCHEME
02690           OUT     (84H),A
02700           LD      DE,3C00H        ;MOVE PRESENT SCREEN
02710           LD      HL,0FC00H       ;TO SHADOWED RAM
02720           LD      BC,1024
02730           LDIR
02740           LD      DE,0FC00H       ;MOVE VIDEO PAGE 2
02750           LD      HL,0F800H       ;TO VIDEO PAGE 1
02760           LD      BC,1024
02770           LDIR
02780           LD      HL,3C00H        ;MOVE SHADOWED RAM
02790           LD      DE,0F800H       ;TO VIDEO PAGE 2
02800           LD      BC,1024
02810           LDIR
02820 CHG3      LD      A,60H           ;RESTORE MEMORY SCHEME
02830           OUT     (84H),A
02840 STOP      RET                     ;RTN 2ND HALF PART THREE
02850 INTHLD    DEFW    0
02860 LAST      DEFB    0
02870 MESS      DEFM    '***  Partition Two  ***'
02880 MESS2     DEFM    '<<< TIMES2 -'
02890           DEFM    ' Written by E. Cameron Snyder'
02900           DEFM    ' (c)1985 >>>'
02910 MESS3     DEFM    'TIMES2 already resident or other CONFLICTING routine resi
dent.  '
02920           DEFM    'Push RESET and reload.'
02930 MESS4     DEFM    'RELEASE THE <F> KEY'
02940           END     BEGIN
```

End

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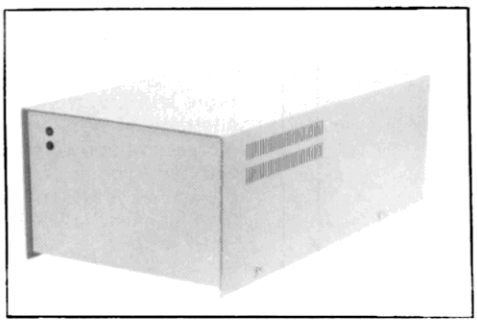

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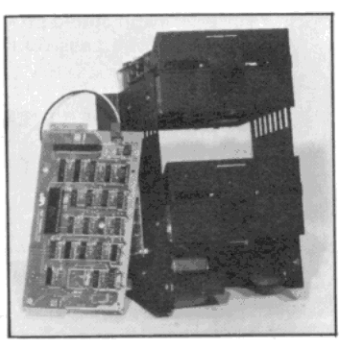

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Listing 4 continued

```
300 PRINT
310 PRINT "Tap a number to make selection."
320 Q$=INKEY$
330 IF Q$="" OR INSTR("123456",Q$)=0 THEN 320
340 PRINT
350 C=VAL(Q$)
360 ON C GOSUB 380,400,420,440,460,480
370 GOTO 230
380 PRINT "Type choice for APPETIZER and press enter."
390 INPUT B(C): RETURN
400 PRINT "Type SOUP choice and enter."
410 INPUT B(C): RETURN
420 PRINT "Select SALAD and enter."
430 INPUT B(C): RETURN
440 PRINT "ENTREE selection (and enter)"
450 INPUT B(C): RETURN
460 PRINT "Enter a BEVERAGE."
470 INPUT B(C): RETURN
480 PRINT "DESSERT selection."
490 INPUT B(C): RETURN
500 END
```

End

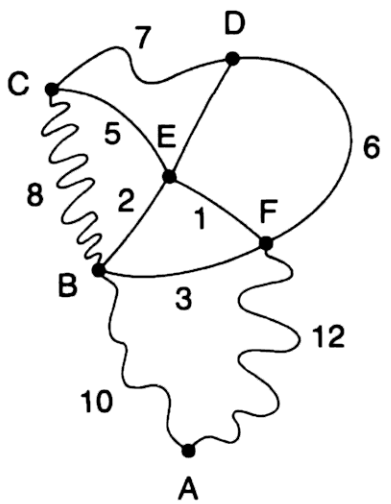

Figure 2. The map for Gumball Route.

The arrow is a simple and useful form on which a beginner can build.

The next beginner's discovery is the skipper, and programming life temporarily becomes a merry series of GOTOs. The skipper can create problems because it's tough to keep control of all the action. It demands precision and attention. Making a skipper work can be disheartening.

The example I've used, Gumball Route (Program Listing 2), is a computer solution to the problem in Fig. 2. That figure shows the mileage among six towns: A, B, C, D, E, and F. The gumball route driver's goal is to start at A, visit each site, and return to A in the shortest possible route. Traditionally, this is called the Traveling Salesman Problem. It's really critical path scheduling.

The program I've written finds the best possible answer it can by bumbling along the route. Watch the program run. Read the listing's events. I think you'll see what happens. The program will continue to search for a shorter route until you break into it to stop it. I should warn you that even mildly complex critical path simulations might take longer to produce good results than you have time to wait.

So, the arrow form of programming is simplistic and of limited effectiveness. The skipper has its charm but it's difficult to form. We come to my favorite, the crucible. It's the quintessential Basic program format. You might use hundreds of lines to set up the situation, and the crucible focuses on one small area, bringing all force to bear on one or more crucial program events.

Now that I've made it sound mystical, let me deflate myself by offering a lowly example. It's Interest (Program Listing 3). Look at lines 210–240. They contain a For. . .Next loop that prints the building result of an investment. It could loop a million times if asked. It is the crucible of the program, and it is also the result.

In studying programs written by others, look for that crucible to get a quick understanding of what happens and why. Problems with the crucible? Some programs include so many GOSUBs, If. . .Then tests, changing values, and actions that they slow run time measurably. A program performing 50 tests within a crucial area can turn a run into an ice jam.

Now for the choice. It's also called a menu program. It gives you a screen menu from which the program goes on command to a subevent—and returns to the menu. GOSUB and GOTO trigger these forays. A menu program can be speedy because it avoids program areas not needed at the moment.

Menu (Program Listing 4) is about food, but remember that the menu of Basic pertains to listing user choices, not culinary decisions. This menu about food illustrates how you can, in this case, plan a meal by adding and replacing elements. Lines 260–280 contain a loop that prints menu choices. Line 320 invites a choice from 1 to 6, and the INSTR test in line 330 prevents any answer except 1 through 6. Line 360 sends the program to the appropriate area for action. This line is a good Basic command to learn, for it shortens otherwise messy decisions.

In a more complex menu program, you might have choices to load material to and from disk, to sort, add, delete, line print items meeting tests set within the program, and more. There's always more.

I'm not claiming that these four forms encompass all of Basic programming. However, when you study program format, I think you'll find many examples that neatly fit these ideas. The four examples should give you a clue to your Basic progress. If you are just arriving at the arrow stage, take heart. The journey ahead grows more interesting.■

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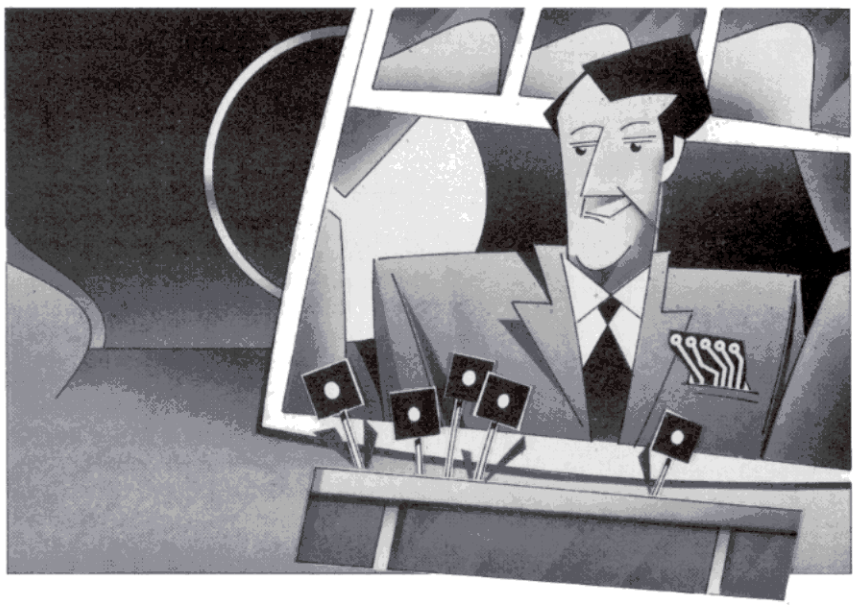

With this month's program, I'll complete my Model 4 windowing system. The Program Listing is the system's user interface; it lets you redefine a window or invoke any TRSDOS library command at any time without destroying the screen contents.

Assemble this month's program as WU/FLT. Then, provided you named the first program WD/CMD (see the June Next Step, p. 102) and last month's program WS/CMD (see p. 100), you can install the entire windowing system from the TRSDOS Ready prompt with these commands:

```
WD
WS
SET *WU WU
FILTER *KI *WU
```

The first line puts the window driver in place, the second adds the windowing supervisory call (SVC), and the last two lines link this month's user routine to the keyboard driver. As each module loads, it prints an appropriate message on the screen.

When you have all three programs up and running, you can press control-W at any time and a block of information will appear at the top of the screen telling you the row and column parameters of the present window as well as how many windows sit in an alternate memory bank.

The program gives you the option of opening a new window, closing a window and returning to the one below it, calling a DOS command, or returning to the present window and the program running there. Programs that display text with the @DSPLY and @DSP SVCs will stay within whatever windows you set. Those that transfer blocks of data directly to the screen or move the cursor to specific locations may not.

LOAD 80

System Requirements

Models 4 and 4P
128K RAM
TRSDOS 6.2
Assembly language
Editor/assembler

Program Listing. The windowing system's user interface.

```
00002 ;*****************************************************************
00003 ;
00004 ;       Windowing system -- User interface
00005 ;
00006 ;       Installation instructions:
00007 ;           SET *dv WINDOW/FLT
00008 ;           FILTER *KI *dv
00009 ;
00010 ;*****************************************************************
00011 ;
00012 ;SVCs used:
00013 @CHNIO   EQU     20
00014 @CKBRKC  EQU     106
00015 @CLS     EQU     105
00016 @CMNDR   EQU     25
00017 @DECHEX  EQU     96
00018 @DSPLY   EQU     10
00019 @EXIT    EQU     22
00020 @FLAGS   EQU     101
00021 @GTMOD   EQU     83
00022 @HIGH$   EQU     100
00023 @KEY     EQU     1
00024 @KEYIN   EQU     9
00025 @WINDOW  EQU     127
00026 ;---------------------------------------------------------------
00027 ; Other equates:
00028 CR       EQU     0DH             ;Carriage return character
00029 LF       EQU     0AH             ;Line feed
00030 ETX      EQU     03H
00031 ;
00032 ;---------------------------------------------------------------
00033 ;
00034 ;  If you use EDAS or PRO-CREATE, add the following Macro definition:
00035 ;
00036 ;SVC     MACRO   #NUM
00037 ;        LD      A,#NUM
00038 ;        RST     28H
00039 ;        ENDM
00040 ;
00041 ;  Also change all uses of '.SHL.' to '<'
00042 ;   for example,    LD  BC,1.SHL.8+191
00043 ;   should become   LD  BC,1<8+191
00044 ;
00045 ;*****************************************************************
00046 ;
00047          PSECT   3000H          ;With EDAS use ORG  3000H
00048 BEGIN    JR      START          ;Set up standard header
```

Listing continued

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	NAME	DESCRIPTION
1	RULE78	Interest Apportionment by Rule of the 78's
2	ANNU1	Annuity computation program
3	DATE	Time between dates
4	DAYYEAR	Day of year a particular date falls on
5	LEASEINT	Interest rate on lease
6	BREAKEVN	Breakeven analysis
7	DEPRSL	Straightline depreciation
8	DEPRSY	Sum of the digits depreciation
9	DEPRDB	Declining balance depreciation
10	DEPRDDB	Double declining balance depreciation
11	TAXDEP	Cash flow vs. depreciation tables
12	CHECK2	Prints NEBS checks along with daily register
13	CHECKBK1	Checkbook maintenance program
14	MORTGAGE/A	Mortgage amortization table
15	MULTMON	Computes time needed for money to double, triple, etc.
16	SALVAGE	Determines salvage value of an investment
17	RRVARIN	Rate of return on investment with variable inflows
18	RRCONST	Rate of return on investment with constant inflows
19	EFFECT	Effective interest rate of a loan
20	FVAL	Future value of an investment (compound interest)
21	PVAL	Present value of a future amount
22	LOANPAY	Amount of payment on a loan
23	REGWITH	Equal withdrawals from investment to leave 0 over
24	SIMPDISK	Simple discount analysis
25	DATEVAL	Equivalent & nonequivalent dated values for oblig.
26	ANNUDEF	Present value of deferred annuities
27	MARKUP	% Markup analysis for items
28	SINKFUND	Sinking fund amortization program
29	BONDVAL	Value of a bond
30	DEPLETE	Depletion analysis
31	BLACKSH	Black Scholes options analysis
32	STOCVAL1	Expected return on stock via discounts dividends
33	WARVAL	Value of a warrant
34	BONDVAL2	Value of a bond
35	EPSEST	Estimate of future earnings per share for company
36	BETAALPH	Computes alpha and beta variables for stock
37	SHARPE1	Portfolio selection model-i.e. what stocks to hold
38	OPTWRITE	Option writing computations
39	RTVAL	Value of a right
40	EXPVAL	Expected value analysis
41	BAYES	Bayesian decisions
42	VALPRINF	Value of perfect information
43	VALADINF	Value of additional information
44	UTILITY	Derives utility function
45	SIMPLEX	Linear programming solution by simplex method
46	TRANS	Transportation method for linear programming
47	EOQ	Economic order quantity inventory model
48	QUEUE1	Single server queueing (waiting line) model
49	CVP	Cost-volume-profit analysis
50	CONDPROF	Conditional profit tables
51	OPTLOSS	Opportunity loss tables
52	FQUOQ	Fixed quantity economic order quantity model
53	FQEOWSH	As above but with shortages permitted
54	FQEOQPB	As above but with quantity price breaks
55	QUEUECB	Cost-benefit waiting line analysis
56	NCFANAL	Net cash-flow analysis for simple investment
57	PROFIND	Profitability index of a project
58	CAP1	Cap. Asset Pr. Model analysis of project
59	WACC	Weighted average cost of capital
60	COMPBAL	True rate on loan with compensating bal. required
61	DISCBAL	True rate on discounted loan
62	MERGANAL	Merger analysis computations
63	FINRAT	Financial ratios for a firm
64	NPV	Net present value of project
65	PRINDLAS	Laspeyres price index
66	PRINDPA	Paasche price index
67	SEASIND	Constructs seasonal quantity indices for company
68	TIMETR	Time series analysis linear trend
69	TIMEMOV	Time series analysis moving average trend
70	FUPRINF	Future price estimation with inflation
71	MAILPAC	Mailing list system
72	LETWRT	Letter writing system-links with MAILPAC
73	SORT3	Sorts list of names
74	LABEL1	Shipping label maker
75	LABEL2	Name label maker
76	BUSBUD	DOME business bookkeeping system
77	TIMECLCK	Computes weeks total hours from timeclock info.
78	ACCTPAY	In memory accounts payable system-storage permitted
79	INVOICE	Generate invoice on screen and print on printer
80	INVENT2	In memory inventory control system
81	TELDIR	Computerized telephone directory
82	TIMUSAN	Time use analysis
83	ASSIGN	Use of assignment algorithm for optimal job assign.
84	ACCTREC	In memory accounts receivable system-storage ok
85	TERMSPAY	Compares 3 methods of repayment of loans
86	PAYNET	Computes gross pay required for given net
87	SELLPR	Computes selling price for given after tax amount
88	ARBCOMP	Arbitrage computations
89	DEPRSF	Sinking fund depreciation
90	UPSZONE	Finds UPS zones from zip code
91	ENVELOPE	Types envelope including return address
92	AUTOEXP	Automobile expense analysis
93	INSFILE	Insurance policy file
94	PAYROLL2	In memory payroll system
95	DILANAL	Dilution analysis
96	LOANAFFD	Loan amount a borrower can afford
97	RENTPRCH	Purchase price for rental property
98	SALELEAS	Sale-leaseback analysis
99	RRCONVBD	Investor's rate of return on convertable bond
100	PORTVAL9	Stock market portfolio storage-valuation program

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Listing continued

```
00049 OLDHI   DW      0               ;Save old HIGH$
00050         DB      2               ;Name length
00051         DEFM    'WU'            ;Module name
00052 MODDCB  DW      0               ;Storage space
00053         DW      0               ;Reserved for system
00054 NOW_ON  DB      0               ;Flag for current status
00055 OPREG   DB      0               ;Storage for OPREG$ image
00056 CFLAG   DB      0               ;Storage for CFLAG$ image
00057 NUM_W   DB      0               ;Storage for current # of windows
00058 OVRLY   DB      0               ;Storage for overlay number
00059 ;
00060 ;-----------------------------------------------------------------
00061 ;
00062 START   JR      C,FILTER        ;Go if @GET request
00063 ;
00064 ;  Here if @CTL
00065 ;
00066 CHAIN   LD      IX,(MODDCB)     ;Get DCB pointer from header
00067 RL01    EQU     $-2
00068         SVC     @CHNIO          ;Pass down the chain
00069         RET
00070 ;
00071 ;  Here if @GET
00072 ;
00073 FILTER  CALL    CHAIN           ;Get keystroke
00074 RL02    EQU     $-2
00075         RET     NZ              ;If no character or error
00076 ;
00077 ;  Character was received from I/O chain
00078 ;
00079         CP      17H             ;Ctrl-W ?
00080         JR      Z,MAYBE         ;Yes -- continue
00081         CP      A               ;Reset Z flag
00082         RET                     ;Back to caller
00083 ;
00084 ;  Got a Ctrl-W.  Now avoid recursion
00085 ;
00086 MAYBE   LD      A,(NOW_ON)      ;P/u current flag
00087 RL03    EQU     $-2
00088         OR      A               ;Check setting
00089         JR      Z,OKAY          ;Go if not on
00090 LEAVE   OR      1               ;Set NZ flag
00091         LD      A,0             ;No key
00092         RET                     ;And back to caller
00093 ;
```

Listing continued

If you plan to use a job control language (JCL) file to set up the window system, you should make a small change in the window driver program from June 1985. Near the end of the program, add a line just before the @EXIT SVC that returns control to TRSDOS. The new line should read LD HL,0. Without this line, the JCL thinks the program is reporting an error and aborts.

The User Interface

This month's program is a keyboard filter, with a structure similar to the one I presented in November 1984 (p. 168). The computer calls the filter every time a program asks TRSDOS for keyboard input. If you press control-W, this filter springs into action; otherwise, it passes whatever key you pressed back to the calling program.

The beginning of the program first checks to verify that you've pressed a key, then tests to see if the key is a control-W, and finally checks to ensure that you don't already have the filter running. Without this final check, chaos could result; the filter could end up calling itself over and over, unable to get back to the program that originally called it.

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Once it finishes the tests (line 96), the program sets a flag to show that it's operating. Then it saves the primary and index registers and, by using the window SVC, gets the parameters of the present window.

If the window storage area is full, control returns immediately to the calling program because you can't open any new windows. Otherwise, the program translates the present parameters into ASCII decimal and saves them in display strings. Next, the program sets up its own display window at the top of the screen, clears it, displays the command prompts, and waits for you to press one of four input keys (lines 148–159). It loops until you press a key, then jumps to the appropriate routine.

If you choose to return to the running program, the routine labeled Done (lines 161–177) closes the prompt window, restores the previous condition of the screen and the Z80's registers, then exits as it signals to the calling program that you haven't pressed a key.

The routine to close a window is also very simple. It closes the prompt window and jumps to Done to close the top user window before returning to the running program.

The other two routines are more complex. The DOS routine (lines 183–233) begins by closing the prompt window. Then it saves the current state of the C flag before setting it to allow only DOS library commands.

The DOS routine uses the @CMNDR SVC to send a command to the system for execution, but there is a fundamental problem with using that SVC from a filter. The System commands in TRSDOS use two overlay areas: SYS1–SYS5 and SYS10–SYS12 use the first, 1E00–22FF hexadecimal (hex). The library commands in SYS6 through SYS8 use the second overlay area, 2300–2FFF hex. TRSDOS stores a value at 0069 hex to keep track of the overlay currently in memory. Normally, you can use @CMNDR from a running program without problems. However, if you do so from an input/output filter, the system call might change the contents of the low overlay area. When the filter returns control to the normal input/output path, the routines it expects in the low memory will no longer be there. As a result, your system will crash, sometimes with strange sounds emanating from the internal speaker, sometimes with a frozen display, and sometimes with the disk drives running for no apparent reason.

Therefore, a filter that might cause the low overlay area to change must restore that section of memory before exiting back to the system. I'm sure there must be a way to use TRSDOS routines to per-

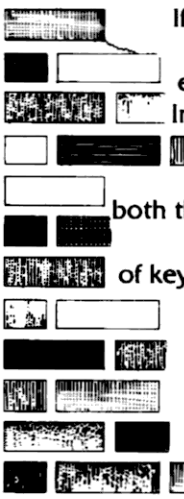
Listing continued

```
00094 ;  Got here successfully with Ctrl-W
00095 ;
00096 OKAY    CPL                     ;Show that we're here
00097         LD      (NOW_ON),A      ;And store
00098 RL04    EQU     $-2
00099         PUSH    BC              ;Save everything
00100         PUSH    DE
00101         PUSH    HL
00102         PUSH    IX
00103         PUSH    IY
00104         LD      B,2             ;Query present window
00105         SVC     @WINDOW
00106         LD      A,C             ;Get current # of windows
00107         CP      15              ;Already full?
00108         JR      NC,DONE2        ;Go if no room
00109         LD      (NUM_W),A       ;Else save count
00110 RL05    EQU     $-2
00111         SVC     @FLAGS          ;IY ==> Flag registers
00112         LD      A,(IY+'O'-'A')  ;Get OPREG$
00113         LD      (OPREG),A       ;And save in data area
00114 RL06    EQU     $-2
00115 ;
00116 ;  Save present parameters in display string
00117 ;
00118         PUSH    BC              ;Save window count
00119         PUSH    DE              ;Save bottom paramters
00120         LD      DE,TOPW         ;DE ==> Display area
00121 RL07    EQU     $-2
00122         CALL    PARM_DEC        ;Put in display string
00123 RL08    EQU     $-2
00124         POP     HL              ;Get bottom parameters
00125         LD      DE,BOTW         ;DE ==> Display area
00126 RL09    EQU     $-2
00127         CALL    PARM_DEC        ;Put in display string
00128 RL10    EQU     $-2
00129         POP     HL              ;Get window count
00130         LD      DE,OPNW         ;DE ==> Display area
00131 RL11    EQU     $-2
00132         CALL    CONV1           ;Display value in L
00133 RL12    EQU     $-2
00134 ;
00135 ;   Set up new window and display info
00136 ;
00137 OUR_W   LD      BC,1.SHL.8+191  ;Open & outline window
00138         LD      HL,0            ;Top corner = 0,0
```

Listing continued

Circle 103 on Reader Service card.

BRICKWARE



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Listing continued

```
00139           LD      DE,3.SHL.8+79   ;Bottom = 3,79
00140           SVC     @WINDOW         ;Set new window
00141 SHOW      SVC     @CLS            ;Clear screen, set 80 char.
00142           LD      HL,PROMPT1      ;HL==> Prompt message
00143 RL13      EQU     $-2
00144           SVC     @DSPLY          ;Display it
00145 ;
00146 ;   Wait for input and perform requested action
00147 ;
00148 INPUT1    SVC     @KEY            ;Get a key
00149           AND     5FH             ;Convert to upper case
00150           CP      'R'             ;Return request?
00151           JR      Z,DONE          ;Yes -- go
00152           CP      'C'             ;Close request?
00153           JR      Z,CLOSE
00154           CP      'O'             ;Open request?
00155           JP      Z,OPEN
00156 RL14      EQU     $-2
00157           CP      'D'             ;Dos request?
00158           JR      Z,DOS
00159           JR      INPUT1          ;Loop for legal entry
00160 ;
00161 DONE      LD      B,0             ;Function: close window
00162           SVC     @WINDOW
00163 DONE1     LD      A,(OPREG)       ;Get memory image
00164 RL15      EQU     $-2
00165           OUT     (84H),A         ;Re-establish
00166           LD      (IY+'O'-'A'),A  ;And reset OPREG$
00167 DONE2     XOR     A               ;A = 0
00168           LD      (NOW_ON),A      ;Store ="not here"
00169 RL16      EQU     $-2
00170           POP     IY              ;Recover all registers
00171           POP     IX
00172           POP     HL
00173           POP     DE
00174           POP     BC
00175           OR      1               ;Set NZ flag
00176           LD      A,0             ;No character to return
00177           RET                     ;Back to caller
00178 ;
00179 CLOSE     LD      B,0             ;Function: close window
00180           SVC     @WINDOW         ;One window closed
00181           JR      DONE            ;And leave
00182 ;
00183 DOS       LD      B,0             ;Function: close window
00184           SVC     @WINDOW         ;Close our window
00185           LD      A,(IY+'C'-'A')  ;Get CFLAG$
00186           LD      (CFLAG),A       ;Save in data area
00187 RL17      EQU     $-2
00188           SET     4,(IY+'C'-'A')  ;Only allow library commands
00189           LD      A,(0069H)       ;Get current overlay number
00190           LD      (OVRLY),A       ;and save
00191 RL18      EQU     $-2
00192           LD      HL,1E00H        ;Beginning of low overlay area
00193           LD      DE,OVRBUF       ;DE==> Temporary storage
00194 RL19      EQU     $-2
00195           LD      BC,500H         ;Bytes to move
00196           LDIR                    ;Save low overlay area
00197 ;
00198 ;   Open full-screen window
00199 ;
00200           LD      HL,0            ;Top: 0,0
00201           LD      DE,23.SHL.8+79  ;Bottom 23,79
00202           LD      BC,1.SHL.8      ;Function: open window
00203           SVC     @WINDOW         ;Open full-screen window
00204 DOSCMD    LD      HL,DOSMSG       ;HL==> Prompt
00205 RL20      EQU     $-2
00206           SVC     @DSPLY          ;On screen
00207           LD      HL,INBUF$       ;HL==> system input buffer
00208 RL21      EQU     $-2
00209           LD      BC,79.SHL.8     ;79 character maximum
00210           SVC     @KEYIN          ;Get the command
00211           JR      NZ,DOSEND       ;Go if error
00212           JR      C,DOSEND        ;  or if <break>
00213           SVC     @CMNDR          ;Process the request
00214 WAIT      SVC     @KEY            ;Wait for key stroke
00215           JR      NZ,WAIT         ;Loop if error
00216           JR      DOSCMD          ;Loop for another command
00217 DOSEND    SVC     @FLAGS          ;IY==> flag table
00218           LD      A,(CFLAG)       ;P/u old version
00219 RL22      EQU     $-2
00220           LD      (IY+'C'-'A'),A  ;Replace old version
00221           LD      HL,OVRBUF       ;HL==Temp storage
00222 RL23      EQU     $-2
00223           LD      DE,1E00H        ;Overlay area
00224           LD      BC,500H         ;Bytes to restore
00225           LDIR                    ;Restore low overlay area
00226           LD      A,(OVRLY)       ;Get old overlay number
00227 RL24      EQU     $-2
00228           LD      (0069H),A       ;Put back in OVRLY$
00229           SVC     @CKBRKC         ;Clear <break> flag
00230           LD      B,0             ;Function: close window
00231           SVC     @WINDOW         ;Return to original window
00232           JP      OUR_W           ;Back to our window
00233 RL25      EQU     $-2
00234 ;
00235 OPEN      LD      A,(NUM_W)       ;Get current window count
00236 RL26      EQU     $-2
00237           CP      14              ;Storage full?
00238           JP      NC,INPUT1       ;Yes -- get a new command
00239 RL27      EQU     $-2
00240           SVC     @CLS            ;Else clear our screen
00241           LD      HL,TOPMSG       ;HL==> message
00242 RL28      EQU     $-2
00243           SVC     @DSPLY          ;And display
```

Listing continued

form the restore, but I haven't found it yet. So, this program stores the entire low overlay area in a buffer, as well as the byte that indicates what overlay is in memory.

The remainder of the DOS routine is simple. It opens a full-screen window and prompts you for a DOS command. The routine passes that command to the system, and a loop returns for another command until you stop it by pressing the break key. Then the program restores everything in low memory to its previous state and loops back to the prompt window.

The final routine opens a new display window (lines 235–283). It clears the prompt area and asks you for the new window parameters.

The only difficult part of this section is accepting the ASCII decimal values you type in and changing them to the binary format the computer requires. The GET RC routine (lines 285–298) does most of the difficult part.

If you enter illegal values or press the break key while entering the parameters, the program returns to the prompt window for further instructions. Otherwise, it opens the new window and exits to it.

The installation section of the program (lines 360–467) does nothing tricky. This program relies on last month's windowing SVC, so it first checks to be sure you've installed that SVC. Since the user interface is a filter, it must also test to see that you used the Set command to load it.

If everything has gone well, the computer moves the main program to high memory and protects it; then the program sets its device control block to show that the filter is capable of handling @GET and @CTL commands. Finally, the initialization section reports a successful installation and returns control to TRSDOS.

Final Comments

The windowing system is the most extensive set of programs I have presented in The Next Step. Depending on your programming needs, you may want to use just the driver, the driver and windowing SVC, or all three for particular projects.

The windows work well with some programs, poorly with others. You'll have to experiment to see how they work with your Model 4 programs. If you wish, you could use the first two programs to create a system of pull-down menus. Also, with a few changes, you could use the second program to create two active windows on the screen at once.

If you develop any interesting applications with the window system, I'd enjoy seeing them on a disk, along with your source code if possible. Please re-

member that *80 Micro* owns the copyright to this windowing system; if you want to distribute any programs based on it, you'll have to take care of some legal formalities first.

A set of programs this complex probably has a bug or two in it. If you find one, write to me and describe in detail what I can do to demonstrate the bug. If you find any major bugs, I'll be sure to include patches in a future column. Please remember, however, that there's a lag time between when I write a column and when you see it. I finished this column during the first week of April. If I hear of a major bug in August, you might not read about it until early next year.■

You can contact Hardin Brothers through CompuServe. Go PCS-117 to the Writers' and Editors' SIG (WESIG) and leave your message addressed to him. Feel free to join in discussions started by others.

You can also write to Hardin at 280 N. Campus Ave., Upland, CA 91786. Enclose a stamped, self-addressed envelope if you want a reply.

Listing continued

```
00244           CALL    GET_RC          ;Get top row/column
00245 RL29      EQU     $-2
00246           JP      C,SHOW          ;Back on <break>
00247 RL30      EQU     $-2
00248           PUSH    HL              ;Save top row/col
00249           LD      HL,BOTMSG       ;HL==> bottom prompt
00250 RL31      EQU     $-2
00251           SVC     @DSPLY          ;And display
00252           CALL    GET_RC          ;Get bottom row/col
00253 RL32      EQU     $-2
00254           JR      NC,OPEN2        ;Go if no <break>
00255           POP     HL              ;Else clear stack
00256           JP      SHOW            ;Back on <break>
00257 RL33      EQU     $-2
00258 OPEN2     PUSH    HL              ;Save bottom row/col
00259           LD      HL,FRMMSG       ;HL==> frame request
00260 RL34      EQU     $-2
00261           SVC     @DSPLY          ;Display it
00262           LD      HL,INBUF$       ;HL==> DOS input buffer
00263 RL35      EQU     $-2
00264           LD      BC,3.SHL.8      ;B = maximum characters
00265           SVC     @KEYIN          ;Get frame character
00266           JR      NC,OPEN3        ;Go if no <break>
00267           POP     HL              ;Else clear the stack
00268           POP     HL
00269           JP      SHOW            ;Back on <break>
00270 RL36      EQU     $-2
00271 OPEN3     SVC     @DECHEX         ;Convert frame value
00272           PUSH    BC              ;Save frame value for later
00273           LD      B,0             ;Function: close window
00274           SVC     @WINDOW
00275           POP     BC              ;Recover frame value in C
00276           POP     DE              ;P/u bottom row/col
00277           POP     HL              ;And top row/col
00278           LD      B,1             ;Function: open window
00279           SVC     @WINDOW
00280           JP      NZ,OUR_W        ;To our window if error
00281 RL37      EQU     $-2
00282           JP      DONE1           ;Back to running program
00283 RL38      EQU     $-2
00284 ;
00285 GET_RC    LD      HL,INBUF$       ;HL==> DOS input buffer
00286 RL39      EQU     $-2
00287           LD      BC,6.SHL.8      ;B = maximum characters
00288           SVC     @KEYIN          ;Get top row/col
00289           RET     C               ;Back on <break>
```

Listing continued

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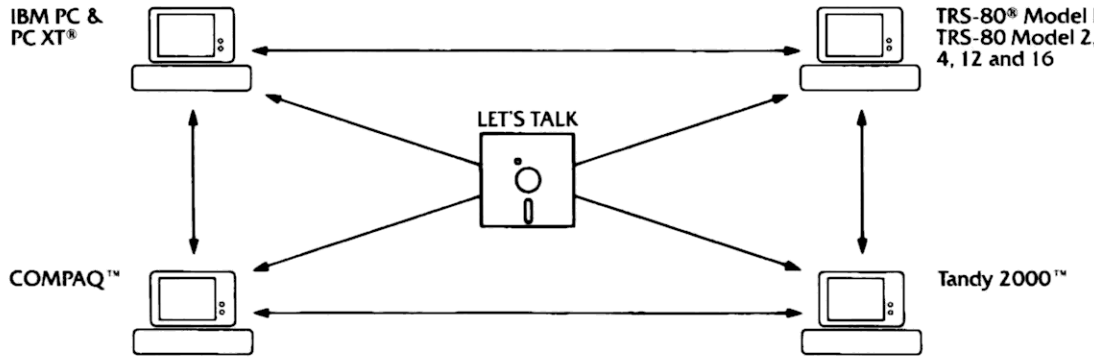

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```
00290           SVC     @DECHEX         ;Convert row to hex
00291           PUSH    BC              ;And save
00292           INC     HL              ;Skip comma
00293           SVC     @DECHEX         ;Convert column to hex
00294           LD      L,C             ;Column to L
00295           POP     BC              ;Recover row
00296           LD      H,C             ;Row to H
00297           OR      A               ;Reset Carry Flag
00298           RET                     ;And return
00299 ;
00300 ; Put present parameters in display strings
00301 ;
00302 PARM_DEC         EQU     $
00303           PUSH    HL              ;Save row/col to convert
00304           LD      L,H             ;Move row to L
00305           CALL    CONV1           ;Convert & store row
00306 RL40      EQU     $-2
00307           LD      A,','           ;Display character
00308           LD      (DE),A          ;To string
00309           INC     DE              ;Point to next area
00310           POP     HL              ;Recover row/col
00311 CONV1     LD      H,0             ;Blank H value
00312           LD      A,' '           ;Blanking space
00313           LD      B,2             ;Maximum string length
00314           CALL    06FAH           ;Into middle of @HEXDEC
00315           RET
00316 ;
00317 ;  Display messages
00318 ;
00319 PROMPT1 DEFM      'Window Commands:'
00320           DEFM    '                               '  ;29 spaces
00321           DEFM    'Current Window Settings:'
00322           DEFB    LF
00323           DEFM    '<O>pen, <C>lose, <D>os Command'
00324           DEFM    '                               '  ;16 spaces
00325           DEFM    'Parameters: '
00326 TOPW      DEFM    '     / '
00327 BOTW      DEFM    '     '
00328           DEFB    LF
00329           DEFM    '  <R>eturn to previous program'
00330           DEFM    '                               '  ;13 spaces
00331           DEFM    'Windows now saved: '
00332 OPNW      DEFM    ' '
00333           DEFB    CR
00334 ;
00335 DOSMSG    DEFM    '(Press <BREAK> to return)'
00336           DB      LF
00337           DEFM    'Dos command? '
00338           DB      ETX
00339 ;
00340 TOPMSG    DEFM    'New top left corner (row,col): '
00341           DB      ETX
00342 ;
00343 BOTMSG    DEFM    'Bottom right corner (row,col): '
00344           DB      ETX
00345 ;
00346 FRMMSG    DEFM    'ASCII Frame character (0 for none): '
00347           DB      ETX
00348 ;
00349 INBUF$    DS      80
00350 OVRBUF    DS      500H
00351 FLTEND    EQU     $-1             ;End of filter
00352 FLTLEN    EQU     $-BEGIN         ;Length of filter
00353 ;
00354 ;*****************************************************************
00355 ;
00356 ;     Installation section
00357 ;
00358 ;*****************************************************************
00359 ;
00360 INIT      PUSH    DE              ;Save DCB pntr
00361           LD      (MODDCB),DE     ;Stuff into filter
00362           LD      HL,SGNON        ;HL==> Sign-on message
00363           SVC     @DSPLY          ;Display on screen
00364           LD      DE,MODNAME      ;DE==>Window SVC name
00365           SVC     @GTMOD          ;Find SVC
00366           JR      Z,VIASET        ;Go if found
00367           LD      HL,NO_SVC       ;HL==>message
00368 ERR_OUT   SVC     @DSPLY          ;Display error message
00369           LD      HL,-1           ;Set extended error
00370           SVC     @EXIT           ;And leave
00371 ;
00372 ;   Installed with SET command?
00373 ;
00374 VIASET    SVC     @FLAGS          ;Point IY to flags
00375           BIT     3,(IY+'C'-'A')  ;Test bit 3 of CFLAG$
00376           JR      NZ,SETHI        ;Go if SET used
00377           LD      HL,SETMSG       ;HL==>"Use SET"
00378           JR      ERR_OUT         ;And leave
00379 ;
00380 ;  Reset HIGH$ and prepare to relocate filter
00381 ;
00382 SETHI     LD      HL,0            ;Get current value
00383           LD      B,L             ;B=0 >> select HIGH$
00384           SVC     @HIGH$
00385           LD      (OLDHI),HL      ;Save in filter header
00386           JR      Z,RELOC         ;Go if no error
00387           LD      HL,NOMEM        ;HL==> No memory msg
00388           JR      ERR_OUT         ;Report error & leave
00389 ;
00390 ;  Move filter to high memory and protect
00391 ;
00392 RELOC     LD      IY,RELTAB       ;IY==> Relocation table
00393           LD      DE,FLTEND       ;DE==> End of filter
00394           XOR     A               ;Reset Carry Flag
```

Listing continued

Listing continued

```
00395           SBC     HL,DE           ;Calculate distance to move
00396           PUSH    HL              ;  and transfer to
00397           POP     BC              ;  BC register pair
00398 RELOC1    LD      L,(IY+0)        ;Get address to change
00399           LD      H,(IY+1)        ;  in HL
00400           LD      A,H             ;Pick up MSB
00401           OR      A               ;Is it 0?
00402           JR      Z,MOVE          ;Yes -- go
00403           LD      E,(HL)          ;Move contents
00404           INC     HL              ;  of address to
00405           LD      D,(HL)          ;  DE reg. pair
00406           EX      DE,HL           ;HL has value to change
00407           ADD     HL,BC           ;Add the offset
00408           EX      DE,HL           ;New value back to DE
00409           LD      (HL),D          ;Put it back
00410           DEC     HL              ;  in the
00411           LD      (HL),E          ;  program
00412           INC     IY              ;Bump IY to next
00413           INC     IY              ;  entry in table
00414           JR      RELOC1          ;Repeat until done
00415 ;
00416 ;     Move module to high memory and protect
00417 ;
00418 MOVE      LD      DE,(OLDHI)      ;DE==>Destination address
00419           LD      HL,FLTEND       ;HL==>Current end of filter
00420           LD      BC,FLTLEN       ;BC = length of module
00421           LDDR                    ;Move it
00422           EX      DE,HL           ;Move new HIGH$ to HL
00423           LD      B,0             ;Select HIGH$
00424           SVC     @HIGH$          ;Set new HIGH$ value
00425           INC     HL              ;HL==>filter entry point
00426 ;
00427 ;    Set type and address in filter's DCB
00428 ;
00429           POP     IX              ;Get DCB addr off stack
00430           LD      (IX),01000101B  ;Set as FILTER capable of
00431                                   ;  @GET & @CTL
00432           LD      (IX+1),L        ;LSB of filter address
00433           LD      (IX+2),H        ;MSB of filter address
00434           LD      HL,SUCCESS      ;HL==> Success message
00435           SVC     @DSPLY
00436           LD      HL,0            ;Show success
00437           RET                     ;Bact to TRSDOS via SET
00438 ;
00439 ;    Messages
00440 ;
00441 MODNAME DEFM    'WS'            ;Window SVC module name
00442           DB      0
00443 SGNON     DEFM    'Windowing System User Filter'
00444           DB      CR
00445 NO_SVC    DEFM    'Window SVC not found -- installation aborted'
00446           DB      CR
00447 SETMSG    DEFM    'Filter must be installed with SET command'
00448           DB      CR
00449 NOMEM     DEFM    'High memory not available for installation'
00450           DB      CR
00451 SUCCESS DEFM    'Installation successfully completed'
00452           DB      LF
00453           DEFM    'Use FILTER command to connect to *KI'
00454           DB      LF
00455           DEFM    'Then use <CTRL><W> to invoke window commands'
00456           DB      CR
00457 ;
00458 ;    Relocation table
00459 ;
00460 RELTAB   DEFW    RL01,RL02,RL03,RL04,RL05,RL06,RL07,RL08
00461           DEFW    RL09,RL10,RL11,RL12,RL13,RL14,RL15,RL16
00462           DEFW    RL17,RL18,RL19,RL20,RL21,RL22,RL23,RL24
00463           DEFW    RL25,RL26,RL27,RL28,RL29,RL30,RL31,RL32
00464           DEFW    RL33,RL34,RL35,RL36,RL37,RL38,RL39,RL40
00465           DEFW    0000
00466 ;
00467           END     INIT
```

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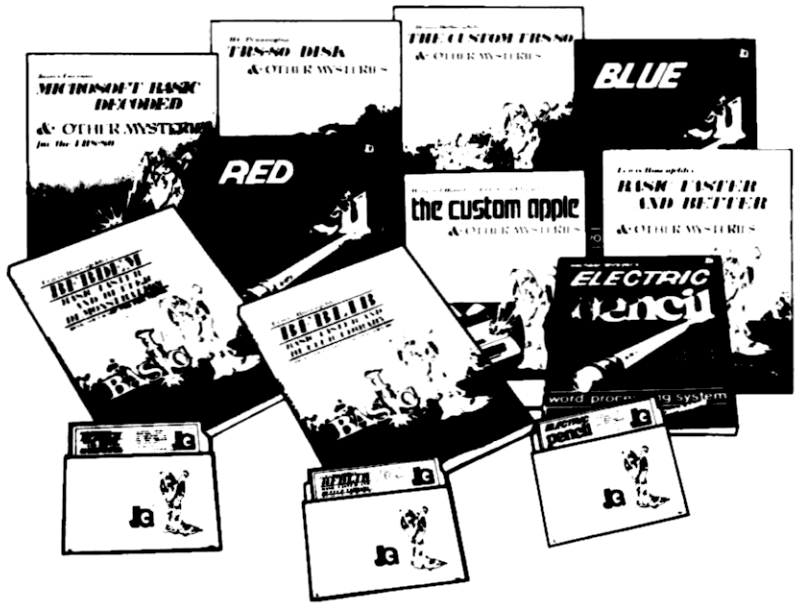

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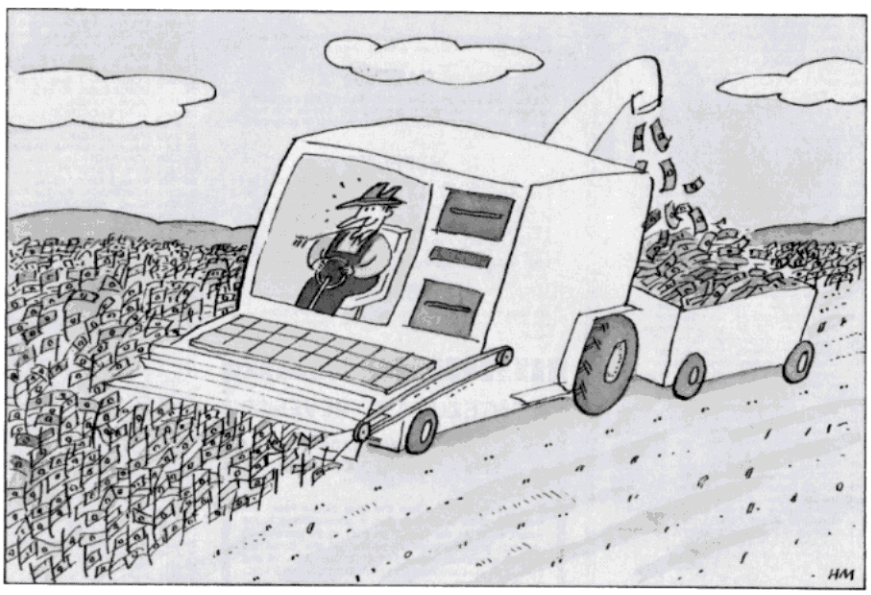
Cash Crop: Bond Yield to Maturity

by L. H. Southmayd



While VisiCalc's built-in functions meet most of my needs, they don't handle common financial calculations like yield to maturity (YTM) or internal rate of return (IROR). These functions require solving nonlinear equations by iterative methods; that is, by trial and error. Lotus 1-2-3's @IRR function is only a partial solution; you still must guess a value to initiate the trial-and-error process.

My template, BondYTM, calculates yield to maturity for standard and zero-coupon bonds; this is the return on your investment, incorporating the interest paid and any capital gain or loss you realize when the bond matures or when you sell it.

The template uses functions available with VisiCalc and which are compatible with Lotus 1-2-3. Because BondYTM uses the secant method to solve the nonlinear equation, it's efficient and fast. Also, you don't have to supply estimated YTMs to start the calculation; the formula does that for you.

Template Features

Figure 1 shows a sample calculation. Rows 7–13 and 16 of column C represent the input area, where you enter data about the bond you're evaluating. The settlement date is when payment for the bond is due; in the sample it is Oct. 15, 1984. Note that you must enter the day, month, and year for settlement and maturity dates.

If you type in zero in the coupon (annual interest) area, the formula calculates both the conventional YTM, using semiannual compounding, and the true

	A	B	C	D	E	F	G	H
1	L. H. Southmayd		BONDYTM/VC or	BONDYTM.WKS	13 character columns			
2	27 Barclay Road			(LOTUS 123)	Row calculation			
3	Scarsdale, N. Y. 10583		914 723 9054					
4								
5		BOND YIELD TO MATURITY *						
6								
7	Settlement Date	MM.DD	10.15					
8		Year	1984					
9	Maturity Date *	MM.DD	7.01					
10		Year	1997		Days		Full 1/2 Yrs	Frac 1/2 Yrs
11	Principal Amount *		1000.00		4642		25	.43561643
12	Coupon (annual interest)		98.00			Set f(YTM)=0		49
13	Price (for $1000 bond)		990.00		Initial Est	f(est YTM)=	1017.65	Secant Est
14	Plus accrued interest		27.65		.09928271257	.55570193	.55570193	.09928271257
15	Total per bond		1017.65		.09977912613	-2.95566911	2.95566911	.0993612739
16	Number of bonds		10			-.00118244	.00118244	.09936130534
17	Total		10176.50			-.00140525	.00140525	.09936110705
18						-.00000007	.00000007	.09936110704
19	* For the yield of a called bond,					-.00000001	.00000001	.09936110704
20	add the premium, e.g., enter $1030					-.00000001	.00000001	.09936110704
21	for a bond callable at 103, and change					.00067811	.00067811	.09936110704
22	the maturity date to the called date.					-.00000001	.00000001	.09936110704
23						-.00000001	.00000001	.09936110704
24							.00000001	.09936110704
25	Bond Yield to Maturity #		9.94 %					
26	Calculated Price Check		990.00					
27								
28	# Conventional YTM (semiannual compounding)							
29	If Zero Coupon, True YTM=		NA %					

Figure 1. BondYTM template.

Illustration by Hal Mayforth

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YTM. I provided this feature because I've found that some zero bond salespeople and ads don't always identify which kind of YTM they're quoting.

After you enter the coupon, price and number of bonds, type in an exclamation point to invoke the Calculate command. In 33 seconds (on a Model III), you'll see the YTM displayed on line 25.

BondYTM also calculates the accrued interest, the adjustment you must make for interest earned since the last interest payment before you bought or sold the bond.

The calculated price check tests the template's accuracy. The calculated YTM, entered automatically in the equation, should give you the bond's price.

Note that when you load the template, VisiCalc displays an error message, then recalculates. When the recalculation is complete, BondYTM is ready to use.

It Figures

The template's calculation area covers columns E–H. The calculation area has two parts: Cell E11 finds the number of days between the settlement and maturity dates, while the rest of the calculation area solves the nonlinear equation using the well-known secant method. Figure 2 shows BondYTM's formula listing.

BondYTM precalculates some variables, such as the number of full half-years and fractional half-years, in order to save computation time per step.

Column E contains the two initial estimates the secant method requires to solve the equation. The first is based on a familiar approximation of YTM. The formula sets the second estimate either ½ percent above or ½ percent below the first, depending on whether the bond's price is below or above par.

I avoid potential divide-by-zero problems by stopping the new iterations when the new estimate equals the old estimate, which is a function of the computer's accuracy. The capacity for nine iterations plus the initial guess provides ample accuracy.

This cell also contains a test for zero-coupon bonds and bonds bought at par. In these two special cases, BondYTM calculates YTM directly and quickly, bypassing all four columns and filling them with @NAs.

The calculations in column F and in cell C26 use the formula for the price of a bond on any date, not necessarily the coupon date. By industry convention, you approximate accrued interest by multiplying half the annual coupon by 1 minus the fractional half-year to the date of the next coupon payment.

The equation in column F is in the form f(x) = 0 where all the variables are known except the estimated YTM, calculated by the secant method in the prior step and taken from column H. The estimated YTM becomes more accurate as f(x) approaches zero within VisiCalc's significant digits.

Column G is the absolute of column F. This part of the algorithm selects the most accurate estimated YTM in column H; that is, the estimated YTM with the lowest absolute value in column F. The @MIN function in cell G24 determines column F's lowest absolute value.

Cell H24 contains a series of chained @IF functions that determine which value in column H matches the lowest absolute value of f(x) = 0 in column F. I used this particular select method to make the cell easily translatable by Lotus 1-2-3.■

```
>E11:(@INT(365.25*C10)+@INT(30.6*@INT(C9))+(C9-@INT(C9)*100))-(@INT(36
  5.25*C8)+@INT(30.6*@INT(C7))+(C7-@INT(C7)*100))
>G11:@INT(E11*2/365)
>H11:@IF((E11*2/365-G11)<.02,0,(E11*2/365-G11))
>H12:+C12/2
>G13:/F$+C13+(H12*(1-H11))
>C14:@INT(H12*(1-H11)*100+.5)/100
>E14:@IF(C12=0,@NA,@IF(C13=1000,@NA,C12+(C11-C13*365/E11)/((C13+C11)/2
  ))
>F14:-G13+((C12/E14*(1-((1+(E14/2))^-G11))+(C11/((1+(E14/2))^G11)+H12)
  /((1+(E14/2))^H11))
>G14:@ABS(F14)
>H14:+E14
>C15:+C13+C14
>E15:@IF(C13<C11,E14*1.005,E14*.995
>F15:-G13+((C12/E15*(1-((1+(E15/2))^-G11))+(C11/((1+(E15/2))^G11)+H12)
  /((1+(E15/2))^H11))
>G15:@ABS(F15)
>H15:@IF(E15=0,0,E15-(F15*(E15-E14)/(F15-F14))
>F16:-G13+((C12/H15*(1-((1+(H15/2))^-G11))+(C11/((1+(H15/2))^G11)+H12)
  /((1+(H15/2))^H11)))
>G16:@ABS(F16)
>H16:@IF(F16=F15,H15,H15-(F16*(H15-H14)/(F16-F15)))
>C17:/F$+C15*C16
>F17:-G13+((C12/H16*(1-((1+(H16/2))^-G11))+(C11/((1+(H16/2))^G11)+H12)
  /((1+(H16/2))^H11)))
>G17:@ABS(F17)
>H17:@IF(F17=F16,H16,H16-(F17*(H16-H15)/(F17-F16)))
>F18:-G13+((C12/H17*(1-((1+(H17/2))^-G11))+(C11/((1+(H17/2))^G11)+H12)
  /((1+(H17/2))^H11)))
>G18:@ABS(F18)
>H18:@IF(F18=F17,H17,H17-(F18*(H17-H16)/(F18-F17)))
>F19:-G13+((C12/H18*(1-((1+(H18/2))^-G11))+(C11/((1+(H18/2))^G11)+H12)
  /((1+(H18/2))^H11)))
>G19:@ABS(F19)
>H19:@IF(F19=F18,H18,H18-(F19*(H18-H17)/(F19-F18)))
>F20:-G13+((C12/H19*(1-((1+(H19/2))^-G11))+(C11/((1+(H19/2))^G11)+H12)
  /((1+(H19/2))^H11)))
>G20:@ABS(F20)
>H20:@IF(F20=F19,H19,H19-(F20*(H19-H18)/(F20-F19)))
>F21:-G13+((C12/H20*(1-((1+(H16/2))^-G11))+(C11/((1+(H20/2))^G11)+H12)
  /((1+(H20/2))^H11)))
>G21:@ABS(F21)
>H21:@IF(F21=F20,H20,H20-(F21*(H20-H19)/(F21-F20)))
>F22:-G13+((C12/H21*(1-((1+(H21/2))^-G11))+(C11/((1+(H21/2))^G11)+H12)
  /((1+(H21/2))^H11)))
>G22:@ABS(F22)
>H22:@IF(F22=F21,H21,H21-(F22*(H21-H20)/(F22-F21)))
>F23:-G13+((C12/H22*(1-((1+(H22/2))^-G11))+(C11/((1+(H22/2))^G11)+H12)
  /((1+(H22/2))^H11)))
>G23:@ABS(F23)
>H23:@IF(F23=F22,H22,H22-(F23*(H22-H21)/(F23-F22)))
>G24:@MIN(G14...G23)
>H24:@IF(G23=G24,H23,@IF(G22=G24,H22,@IF(G21=G24,H21,@IF(G20=G24,H20,@
  IF(G19=G24,H19,@IF(G18=G24,H18,@IF(G17=G24,H17,H16)
>C25:/F$@IF(C12=0,((C11/C13)^(365/(2*E11))-1)*200,@IF(C13=C11,C12/10,1
  00*H24))
>C26:/F$@IF(C13=C11,C13,((C12/(C25/100)*(1-((1+(C25/200))^-G11))+(C11/
  ((1+(C25/200))^G11)+H12)/((1+(C25/200))^H11))-(H12*(1-H11)))
>C29:/F$@IF(C12=0,((C11/C13)^(365/E11)-1)*100,@NA)
```

Figure 2. BondYTM's formula listing.

L.H. Southmayd uses his Model III for investment and tax planning. You can write to him at 27 Barclay Road, Scarsdale, NY 10583.

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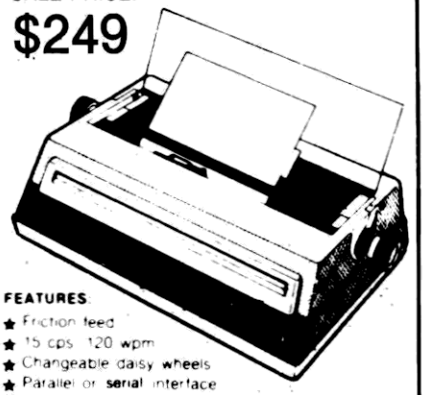

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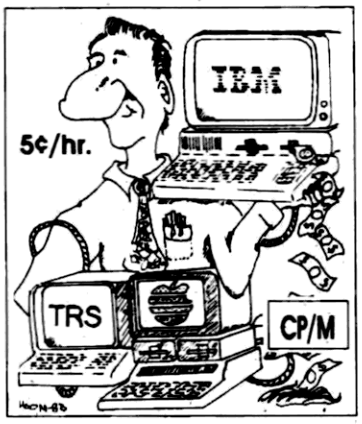

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BASE 2, DIP 81-82-84-85, MPI 88-99-GX	1/2 x 20	$20/2	$57/6	$108/12	$7/1	$6 ea	2 or more	$15/3	$54/12	$288/72
C ITOH Prowriter 1550-8510, NEC 8023-8025, APPLE DMP-IMAGEW	1/2 x 18	$15/2	$42/6	$ 78/12	$7/1	$6 ea	2 or more	$15/3	$54/12	$288/72
C ITOH STARWRITER F-10-40 / DIABLO HYTYPE II — Carbon Film Black	5/16 x 130	$18/3	$60/12	$342/72	$5 ea 3-11	$4 ea	12 or more	$24/6	$42/12	$234/72
Fabric Black	NOT EZ-LOAD 5/16 x 17	$18/2	$51/6	$ 96/12	$8/1	$7 ea	2 or more	$21/3	$78/12	$432/72
RADIO SHACK-TOSHIBA-COMMODORE-PANASONIC-RICOH										
Carbon Film - DWP 210 (Hytype II) Black (1445)	5/16 x 145	$18/3	$60/12	$342/72	$5 ea 3-11	$4 ea	12 or more	$24/6	$42/12	$234/72
DW II, DWP 410-510, RICOH 1200-1300-1600 Black (1419)	1/4 x 145	$18/3	$60/12	$342/72	$5 ea 3-11	$4 ea	12 or more	$24/6	$42/12	$234/72
Red, Green, Blue, Brown Colors (1419)	1/4 x 130	$21/3	$72/12	$420/72	$6 ea 3-11	$5 ea	12 or more	$30/6	$54/12	$234/72
Fabric (Long Life), DWP 210 (Hytype II) Black (1458)	5/16 x 17	$18/2	$51/6	$ 96/12	$8/1	$7 ea	2 or more	$21/3	$78/12	$432/72
DW II, DWP 410-510, RICOH 1200-1300-1600 Black (1449)	NOT EZ-LOAD 1/4 x 25	$18/2	$51/6	$ 96/12	$8/1	$7 ea	2 or more	$21/3	$78/12	$432/72
DMP-100, LP VII, COMMODORE 1525, GORILLA BANANA (1424)	Inker Loop	$18/2	$51/6	$ 96/12	----------			----------		
DMP-200, 120, (430 Inserts & Reloads Only) (1296) (1483)	1/2 x 20	$20/2	$57/6	$108/12	$7/1	$7 ea	2 or more	$15/3	$54/12	$288/72
DMP-400-420, LP VI-VIII, PANASONIC KXP-130 (1418)	5/16 x 14	$15/2	$42/6	$ 78/12	$7/1	$6 ea	2 or more	$15/3	$54/12	$288/72
DMP-500 (1482)	1/2 x 20	$22/2	$63/6	$120/12	$7/1	$6 ea	2 or more	$15/3	$54/12	$288/72
DMP-2100, TOSHIBA P1340-1350-1351 (1442)	1/2 x 20	$15/2	$42/6	$ 78/12	$7/1	$6 ea	2 or more	$15/3	$54/12	$288/72
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MX-FX-RX 100, IBM PC (Wide Paper)	1/2 x 30	$18/2	$51/6	$ 96/12	$8/1	$7 ea	2 or more	$18/3	$66/12	$360/72
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-Fabric -2000-3500 (Can Reload All)	1/2 x 14	$18/2	$51/6	$ 96/12	$8/1	$7 ea	2 or more	$15/3	$54/12	$288/72
-5500-7700 (Can Reload All)	1/2 x 13	$15/2	$42/6	$ 78/12	$8/1	$7 ea	2 or more	$15/3	$54/12	$288/72
OKIDATA Pacemark 2350-2410 Black	1/2 x 100		$32 each		$20/1	$18 ea	2 or more	36/3	$132/12	$720/72
Microline ML-80-82-83-92-93 (Call for ML-84 Prices)	1/2 x 16	Spool	$39/12	$216/72						
MANNESMAN-TALLY MT-160	9mm x 11	$19/2	$54/6	$102/12						
MT-180	9mm x 13	$20/2	$57/6	$108/12						
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PANASONIC KXP-1090-1091-1092-1093	5/16 x 3	$20/2	$57/6	$108/12						
BROTHER HR-15-25-35 / COMREX DX-15, II — Carbon Film (Multistrike or Correctable)	5/16 x 82	$18/3	$60/12	$342/72						
Fabric (Call for Comrex 420 Prices)	5/16 x 17	$15/2	$42/12	$ 78/72						

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Tidbit #26

Self-modifying Basic code can be an effective way to store updated variables in a program for use the next time you run the program. Some Basic programs use a sequential series of consecutive numbers over a long time period. For example, an invoice-creation program might start with invoice number 101, then go on to number 102, 103, and so on.

The Program Listing shows how to modify a Basic program so that it continues a numerical series regardless of how often you boot up the program.

Set the starting number as a string variable (N$ in line 110). The program converts that string to a numeric variable using Basic's VAL function. Thereafter, work only with the numeric variable.

The routine in lines 120–150 shows you where you put your program. The modifying technique appears in lines 160–230. Put these lines at the end of your program.

Basic's STR$ function converts the updated number back to a string and the MID$ function removes the leading space (M$ in line 160). The new string is made equal in length to the old one.

Line 170 checks to ensure that the new number isn't too long (as might occur if you went from 999 to 1000).

In lines 190 and 200, Basic's VARPTR function finds the memory locations of the old and new strings.

The key to this technique is in line 210. This routine POKEs each character of the new string into the original string. If you haven't used the original string, Basic still finds it within the Basic program line. By POKEing in new characters, the program changes the string without moving it. If you list the program after running line 210, you'll see that line 110 has changed, with N$ now equal to the new value.

Line 220 saves the modified program to disk. The program is stored with a new starting number in line 110. The next time you run the program, it will have the correct starting number.

One warning for when you first try this technique. Always test it on a spare disk. When POKEing around in Basic, you can easily make a major mistake. Also, this program overwrites the original program, so you should store a back-up copy on another disk.

Andy Levinson
Studio City, CA

```
100 'Demonstration of Self-Modifying Basic Code - Andy Levinson
110 N$="101":N=VAL(N$)                          'Starting Number
120 'Main routine goes here.    Process number using N, not N$.
130 N=N+1:PRINT "Next Number is";N   'Bump Count and Display It
140 PRINT "Select:  <N>ext Number or <S>ave Program"      'Menu
150 I$=INKEY$:IF I$="N" THEN 120 ELSE IF I$<>"S" THEN 150 'Pick
160 M$=MID$(STR$(N),2):L=LEN(N$)-LEN(M$)     'Convert to String
170 IF L<0 THEN PRINT "New Number too Large!":STOP  'Error Trap
180 M$=M$+STRING$(L,32)                      'Pad out with spaces
190 X!=VARPTR(N$):GOSUB 230:N1!=X!         'Find memory location
200 X!=VARPTR(M$):GOSUB 230:N2!=X!         'of Old & New Numbers
210 FOR X=0 TO LEN(N$)-1:POKE N1!+X,PEEK(N2!+X):NEXT X  'Change
220 SAVE "DEMO/BAS":END                  'Save program and finish
230 X!=PEEK(X!+1)+256*PEEK(X!+2):X!=X!+(X!>32767)*65536: RETURN
```

Continued from p. 36

ments, and so on). It highlights relevant dates when it displays the calendar.

You use the calculator as you would any other calculator. Your current number appears at the top of the window, and the mathematical operands appear in the lower part of the window. The calculator does offer one nonstandard feature, the Auto key. When you press the A key just before closing the calculator window, the results of calculations you made appear on your current screen at the cursor location. You could, for example, insert a calculated value in a letter or annual report.

The index card window lets you enter text on an electronic 3- by 5-inch card. The same editing features available with Notepad are available here. Monte's Window organizes the index cards by subject line and lets you write up to eight lines of text for each one.

You move forward or backward through the cards in the file with the arrow keys, and you can copy the selected card to the note pad for printing or editing.

Index Cards' most powerful feature is the context search capability. You can enter a partial or complete text pattern as a search argument without regard to case.

Monte's Window supports CP/M system commands, too. From within the window, you can easily display the directory of any disk drive, the amount of free space on a drive, change the current default drive, and erase files.

With the CP/M window, you can also change the current user area any time. This is vital if you have a hard disk system with many user partitions, which is the only way CP/M segregates files (similar to MS-DOS's subdirectories).

And More

Monte's Window offers some clever features that Montezuma Micro doesn't advertise. For example, you've probably encountered CP/M's dreaded R/O error on a disk or file, forcing you to hit control-C to exit a program, thereby losing your files. Monte's Window won't accept this command, and it intercepts control-C's warm boot and tries to return you to the running program.

In addition, you can implement Monte's Window without using the shift keys; you just invoke the program through a system call to address 0040H (in the reserved CP/M area).

Conclusion

Monte's Window performs well. After the novelty of calling windows and using concurrent applications wears off, you'll find so many uses for the collection of programs that you won't know how you did without them.■

Major Math For Math Majors

by Thomas L. Quindry

★★★

The Math Master Series runs on the Model III and requires one disk drive. PAB Software Inc., P.O. Box 15397, Fort Wayne, IN 46885, 219-485-6980. Various math modules $24.95 to $39.95 each.

Easy to use: ★★★☆☆
Good docs: ★☆☆☆☆
Bug free: ★★☆☆☆
Does the job: ★★★★☆

The Math Master Series of programs are highly specialized Basic language packages for the engineer, scientist, or math student, that is, the serious math user rather than the average computerist. The programs provide mathematical functions for matrix, polynomial, and vector arithmetic and fast Fourier transforms (FFTs), but they're somewhat awkward to use and the documentation isn't that enlightening.

PAB offers each math module separately, which is advantageous if you need only one module, but adds up to a lot of money if you have to buy them all. The modules perform their routines on matrix or array variables.

Up and Running

To use a particular function, you have to load the module and protect high memory. Next, you load and run the supplied initialization program. Then you run the Basic program containing the calls to the module, which are made through the /CMD statement. For example, to use the Matrix Master single-precision module, the statement CMD MAT A = B + C, sets matrix A equal to the sum of matrixes B and C.

The initialization program is the same for all modules. It sets up a DEFUSR function and calls it by way of the USR function to install the CMD pointer.

If you use more than one math module in a program, you have to use the Math Master executive module, which loads other modules. You can have only one module resident in a program at a time since the modules overlay practically the same memory area. The Math Master executive analyzes the /CMD function and loads the math functions as needed.

The Math Master Series has one major flaw. It provides no error-checking to verify that you've initialized a program; if you try to initialize a module more than once, the computer hangs up. And the series doesn't support Model III TRSDOS's CMD L command to load the modules as needed, because you need to reinitialize.

The Modules

You can use each of the Matrix Master modules (single- or double-precision, scaler, or complex) to execute a series of math functions on a matrix: addition, subtraction, and multiplication; scalar (or complex) addition, subtraction, multiplication or division; transpose; inverse; scalar (or complex) variable assign; matrix assign; identity matrix, determinant; and disk or tape input/output functions.

The command structure is similar for each module and PAB provides an example of solving a simultaneous linear equation using the single-precision Matrix Master. The Matrix Master functions are matrix inverse and matrix multiply.

The single- or double-precision Poly Master modules provide a series of polynomial functions for initialization, math, and general manipulation. These modules perform addition; subtraction; multiplication; division; derivative; integral; assignment; value; greatest common divisor; normalize; scalar addition, subtraction, multiplication, and division; scalar assign; and disk and tape input/output functions. Command structure is similar for each module. The single- or double-precision Poly Root Master modules add the commands, Root and ROOTD, allowing polynomial root computations.

The single- and double-precision and scaled integer fast Fourier transform modules provide analyses using several different qualifiers. The qualifiers are real, inverse, Hanning weighting, magnitude, and phase of the transformed data. You don't have to use a qualifier, however, and you can input and output the arrays to a disk file.

Conclusion

The Math Master Series' documentation runs from only eight to 17 pages for each module. PAB assumes that the user has a working knowledge of matrix and/or fast Fourier transform arithmetic rules and terminology. The instructions are minimal and barely adequate.

This program could be easier to use. It is rather archaic to have to remember the correct memory size to protect each time you use one of the packages.

Though these problems exist, good math packages are hard to find. A highly technical user with specific applications would find these packages useful. Since similar packages are available for the IBM PC and Apple II, it would be easy to transport the Basic programs produced with a minimum of fuss.■